

Discrete Event Simulator (DES) in Python Programming Environment

User manual

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Dictionary of Terms

Notion	Explanation, description
State Transition	When a finite state automaton switches from one state to another, this is called a <u>state transition</u> .
DES (DES = Discrete Event Simulator)	"Discrete Event Simulator" is a simulation tool (program) that determines the effect (consequences) of events randomly occurring in time.
DES object	Operation objects of the program "Discrete Event Simulator". Operations are performed using entities. When Entities enter an action object, they are exposed to various effects, which are "done" by the Entities exiting the output of the action object. The actions are: Create entity; Entity termination; Deferring the progress of an Entity, Packing Entities into another Entity; Unpack Entities from an Entity. DES objects are: The Source object; the sink object; storage and working objects (Buffer, Machine); wrapper object; Unwrapper object.
dynamic	<u>Dynamic systems</u> are time-dependent systems in which events occur at a time determined by probability variables.
discrete probability variable	A <u>discrete probability variable</u> is a variable that can only take separate (discrete) values, and a continuous is one that can take any value over at least one interval.
even distribution	For a <u>uniform distribution</u> , the probability of occurrence of all expected values between the specified minimum and maximum values is the same.
Empirical distribution	Probability density function established experimentally based on measurement results
Entity	In the simulation system, the <u>worker element (object)</u> is the Entity. The Entity also has several attribute types to allow it to store information collected between DES objects along its path and to bring data/lists to individual DES objects along the way.
Time-independent system	A system whose <u>parameters do not depend on time</u> (have a constant value).
Time-dependent system	A system whose <u>parameters are time-dependent</u> and define a new state based on previous states of the system.

Notion	Explanation, description
linear system	A system, e.g., coupling, whose relationship between its parameters (generators, resistors, etc.) and state characteristics (current, voltage) can be described by linear equations or linear differential equations. For linear systems, the principle of superposition applies. Since linear systems are much simpler to calculate than nonlinear systems, the latter are often replaced by linear systems, at least in stages.
Nonlinear system	A system whose output signal (response function) does not change linearly with changes in the input signal (control function). It follows that the study of the passage of both the deterministic signal and the stochastic process on a nonlinear system is usually a complicated task. Nonlinear systems can be divided into two large groups: systems with and without memory. The response function of nonlinear systems with memory at a given point in time depends not only on the instantaneous value of the input signal, but also on its past and even on the state of the system (e.g., energy content). This model can be used to negotiate, for example, rectifiers and parametric amplifiers. In nonlinear systems without memory, the value of the output signal at a given moment depends only on the value of the input signal occurring at the same moment.
static system	A <u>static system</u> is a time-independent system in which calculations are performed using time-independent operational elements.
Stochastic system	A <u>stochastic system</u> , also known as a random system, is a process characterized – in whole or in part – by probability variables. The opposite is the deterministic system, where the variables describing the process do not change randomly.
finite state machine (FSM = Finite State Machine)	A <u>finite state machine</u> (FSM = Finite State Machine) is a system engineering concept used by programmers, mathematicians, engineers, and other experts to describe a mathematical model of an arbitrary system that has a finite number of (conditional) states.

Introduction

With this article, I would like to introduce the Discrete Event Simulator that I created to enable the examination of finite state automata and stochastic feedback time-dependent systems on a digital computer.

I first heard about finite state automata back in 1974 in the **lecture of Dr. Béla Lantos** (professor, BME Department of Process Control). Unlike the engineering approach, which is always practice- and implementation-oriented, Mr. Teacher's lecture exploring deep mathematical concepts and their connections was very new at the time. We didn't really understand every part of it, but we passed the exam, and it polished our minds.

Later, when I solved various tasks as a practicing engineer, I came across the tasks of system technology many times, where:

- nonlinear
- time-dependent and
- stochastic

systems were tested using various criteria that simplify calculations.

The testing of these systems was difficult until PCs became widespread, and even later it was not possible to obtain software packages with which to experiment.

In 1998, **dr. Zoltán Schvarcz**, software director of Humansoft Kft. invited me to a task where we presented the Taylor Enterprise Dynamics (Taylor ED) discrete event simulation program to Hungarian research institutes, universities, and large companies. We gave many presentations and case studies, but the possibilities offered by the new tools were less understandable for large companies with a less developed simulation culture at that time.

The effectiveness of experiments with simulation programs was mainly recognized by research institutes and universities. This is how Taylor ED got into a teaching and research environment at various faculties of the University of Miskolc and BME (Faculty of Mechanical Engineering and Faculty of Transport and Vehicle Engineering), as well as the Siemens Plant Simulation program at BME's Department of Mechanical Engineering and SZTAKI.

Compared to 20 years ago, there are now many software-based design programs available to engineers designing (different types of systems) that:

- calculations using geometry-dependent finite element technique.
- finite state automata and their improved system engineering variants
- Petri nets (with stochastic, timed, and timed versions),
- network of finite automata,
- Markov chain Modeling

offered to solve the tasks.

Of course, these programs include many years of development activities, which manifests itself at high prices. It takes a long time to learn them, but their effectiveness is extremely high.

In addition, the infinite variety of system engineering tasks still finds new questions that are more difficult to answer even in these simulation systems or require a long time to prepare the data/program to solve the task.

With all this in mind, I started to create a simulation framework like Taylor ED, which aimed to implement a simple structure (and programming) finite state automatic.

I started the program in C++, then switched to Delphi, and finally I created most of the service versions in Python.

A C++ and Delphi versions are also functional and have all object properties and methods, a significant set of procedures and functions is available for convenient management of the DES data structure.

Although I used the name finite automaton, each of the developed object-oriented discrete event elements contains several finite state machines that implement the necessary operations in different interconnections.

The discrete event simulator (DES = Discrete Event System) Entities (operation subjects) are carried through by elements that ensure the implementation of random timed events (DES objects) network.

The system can handle any number of processes running in parallel, and the number of managed Entities is limited only by the amount of memory used on the computer. Any cross-looping between processes is possible, i.e., there are no significant restrictions on the topology of the established network.

In the simulation system, the worker element (object) is the Entity, so the Entity also has several attribute types to allow it to store information collected during its journey and to transfer data/lists to individual DES objects along its path.

The Entity cause in the network of DES objects along their path through elements that:

- create Entities for the simulation model,
- temporarily store the Entity if for any reason it cannot proceed further,
- delay the further progress of the Entities in time,
- package the Entity into another Entity,
- extract the Entity from another Entity,
- remove Entities from the simulation network.

If the objects of the discrete event simulator are created and parameterized, all that remains is to connect the objects and the simulation model can be run immediately.

In the first chapter of the current documentation, we review the basic concepts of probability variables and the solutions that can be used to produce random number generators of any type.

The second chapter provides detailed descriptions of the objects implemented in DES Python.

In the third chapter, we learn the steps to create and run a DES program.

The fourth chapter presents the results of the simulation through four easy-to-read sample examples.

Finally, in the fifth chapter, we will introduce the DES Python system, DES Python simulation system structure, attributes, and methods. By understanding the attributes of DES objects, the user can implement arbitrary DES object entity management.

For program development and running of the DES Python system, the following development systems (IDE = Integrated Development Environment) were used:

- Spyder [Home — Spyder IDE \(spyder-ide.org\)](https://spyder-ide.org/)
- PyCharm [PyCharm: the Python IDE for Professional Developers by JetBrains](https://www.jetbrains.com/pycharm/)

A graphical editing program has also been developed in LabVIEW 2016 environment (DES_LabVIEW_GraphEditor) to build the topology and set parameters of the DES Python model. Unfortunately, the detailed description of the editing program did not fit into this user manual, so it will be presented in a subsequent user manual.

Please send any questions, suggestions, and comments about the program to me at the lipovszki@gmail.com e-mail address.

Budapest, 02 November 2023.

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1. What properties do the processes described by discrete events have?

1.1 Continuous time and sampling time systems

In systems that can be described by constant coefficient differential equations (also in the description of sampling and continuous systems), the change in the input signal over time is determined by the change of the input signals over time, based on the properties described by the differential equation. The differential equations used to simulate systems describe the behavior of systems over time, so their independent variable is time.

At the time steps defined in the computer simulation (solution) of continuous and sampled systems, the value of the state variables of the differential equation is calculated, which in practical cases can also be the output variables of the differential equation.

To solve differential equations describing continuous systems, integrators with time variables are used and the results are determined step by time by simple mathematical operations (addition, subtraction, multiplication, division).

Differential equations describing sampling systems too, similarly to the sampling time h , the response of the system to the input signal is calculated at sampling times. For calculations, the basic operations are also used as addition, subtraction, multiplication, division and shifting of signals over time. Shifting signals over time means that if, for example, calculations require the value of the signal from one time step earlier, this value is stored for that cycle. The solution of differential equations to determine the output signal is usually a recursive formula.

For example, an integration operation in sampling steps, where the input signal is multiplied by the coefficient a_1 , is as follows:

$$y[k \cdot h] = a_1 * u[(k - 1) \cdot h] + y[(k - 1) \cdot h] \quad [1.1.1.]$$

where:

h	sampling time
$y[k]$	the output signal at $k \cdot h$
$y[k-1]$	The output signal is $(k-1) \cdot h$
$u[(k-1)]$	The input signal is $(k-1) \cdot h$
a_1	constant.

1.2 Systems described by discrete events.

The elements of systems that can be described by discrete events also have differential/differential equations, but their coefficients are probability variables whose behavior and current parameters are very difficult or impossible to determine. In systems that can be described by discrete events (**DES** = **D**iscrete **E**vent **S**imulation), between elements with different properties, we do not pass the current values of physical quantities with magnitude and dimension, but Entities.

That Entities objects with an arbitrary number and type of attributes relative to simple physical quantities, which are born, migrate between operational units, wait for different periods of time in each operation unit, and then exit the simulation system with the help of a special unit. In DES systems, the basic elements of continuous and sampling systems can be implemented, in which calculations are performed using Entities, in which case the Entity has only one attribute, the physical quantity with which calculations are performed in the equations. It follows that in a simulation system that can be described by discrete events, it is possible to simulate both continuous and sampled system(s), but as we will see, this solution determines the values in a more complicated way.

If the system elements used to simulate discrete events cannot be described by simple mathematical functions, then another solution must be used. If we move from performing mathematical operations to a simulation level, we can describe (determine) the state of the system components.

Such states may be for continuous sampling simulation systems per constituent:

- (all) input signals have already been received for each input of the constituent to determine the next state of the constituent; (True or False)
- the constituent contains (or does not have) stored values which are the result of previous calculations and cycles and are necessary to determine the next state of the constituent; (numeric value, such as $y[t=0]$ in [1.1.2] formula)

Based on these properties, system components can be divided into two large groups:

- historical
- non-historical

properties.

The constituents with historical properties They shall also use values determined in their previous cycle to determine their next state. These values specified in previous cycles must be made available to the constituent at time $t=0$, because without them we cannot start calculations. These values, given at the initial point in time, are system initial conditions is also called. Usually, we need to enter the initial values of the outputs of the system element to carry out calculations, but sometimes there are special cases when the initial value of the input signals is also required.

For example, a constituent with historical properties is integrating member, which adds the value received at its input to the previous value in the output using a multiplying factor.

But what was the output value at the initial time $t=0$? This can be set as the initial condition! For example, if the integrating member (constituent) is a cup whose input signal is the amount of water supplied to the cup and its output signal (integrated signal value) is the level of water in the cup, then the initial value is the water level of the cup at the start of the simulation ($t=0$).

For constituents with non-historical properties They do not have the following state (therefore we do not even need to store any values), because with the signals coming to the input, the system element performs the necessary calculations and then outputs the results of the calculation at its output. Generated during calculations you can even "forget" all previous data, since you don't need to use any of them for the next calculation. Examples of such constituents are addition, subtraction, multiplication or division.

In systems that can be described by discrete events, almost all system elements have historic, i.e. their next state can be determined by means of state changing values recorded at earlier times.

In the following, we will examine what states can be described in DES systems. (Of course, this is only an approach, element types can be defined with a different line of thought.)

You can better understand the need for different system components by defining some Entity object types.

1. An Entity can be a customer who, based on conditions defined by him, enters a store, where he then selects the item(s) he wants to buy and leaves the "purchase system" after payment at the checkout.
2. An Entity can be a car part that arrives at the assembly process at a certain stage (time) of car assembly, is incorporated into the car (semi-finished product) and then, having become part of another Entity, continues to progress through the assembly process. This example shows that Entities can contain any number of other Entities. The Car Entity contains the engine, wheels, windshield, etc. Entities that become elements of the car Entity at some point in the manufacturing process. In the future, from the point of view of production, we will only follow the route of the car's Entity since the Entities in it naturally travel with it.
3. An Entity can be an information data packet that contains some kind of image, sound, or other measurement information in a computer system over a specified time interval. The information packet shall be generated at a specified time and the computer system shall ensure that it reaches the place of use in the shortest possible time. This place of use may be another computer in another city or country; therefore, the transmission of information

data packets must be implemented considering the conditions of data transmission over the network (dealing with network failures).

1.2.1 Structure of the DES_OBJECT block

In the description, we basically use two block diagram elements when presenting the operation of the DES system.

In DES, each DES operation is performed by objects of type **TDES_OBJECT** on objects of type **TDES_ENTITY**.

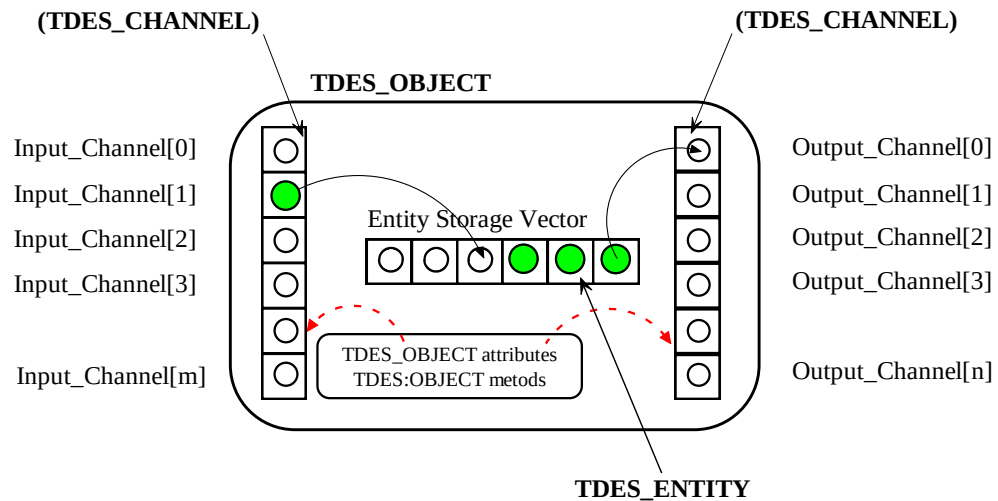


Figure 1.2.1.1 TDES_OBJECT elements and their relationship (with individual inputs and outputs).

The **Figure 1.2.1.1** visible block diagram in a general **TDES_OBJECT** structure, which has the following elements:

- Input channels (m pieces)
 - Output channels (n pieces)
 - Entity container vector (with configurable maximum size)
 - Object attributes
 - Object methods
1. The **attributes** (properties) necessary for the operation of the **TDES_OBJECT** is sent to the unique object when defining the object.
 2. Entities that arrive in the **TDES_OBJECT**'s input feed are loaded into an element of the Entity container vector with a given index using one of the object's read methods (procedures) according to a specific strategy.
 3. With the help of the **method** describing/implementing the operation of the **TDES_OBJECT**, we determine the values of the object's new **attribute** and which Entity (with which index) we need to move from the Entity storage vector to one of the output channels.
 4. Based on the Entity placed in the output channel of the **TDES_OBJECT**, we give a command (task) to DES to move the Entity in the output channel (if possible) to another **TDES_OBJECT** related to our object.
 5. If the Entity was successfully moved, the Entity received in the input feed of the related object initiates the **method** that updates the **attributes** of its own object.
 6. In the next step, the simulation system returns to the third (3rd) step of the operations described here and continues the implementation of the system simulation with the new object

of the Entity.

Going back to step 3 occurs if there are executable commands (tasks) in the simulation system.

7. If the vector where the commands are stored is emptied, the simulation system stops and the simulation ends.

In the following figure, the **TDES_OBJECT**-reason appearance can be seen in the **DES_LabVIEW_GraphEditor** Applying. Create objects in the graphical editor **SINGLE_CHANNEL_DES_OBJECT**, which will later be applied in the DES model.

If you select **TBUFFER_(6_Inputs_6_Outputs).vi**, the icon of the **TBUFFER** DES object appears in the Diagram Panel window (right window) (**Figure 1.2.1.2 1.2.1.2**).

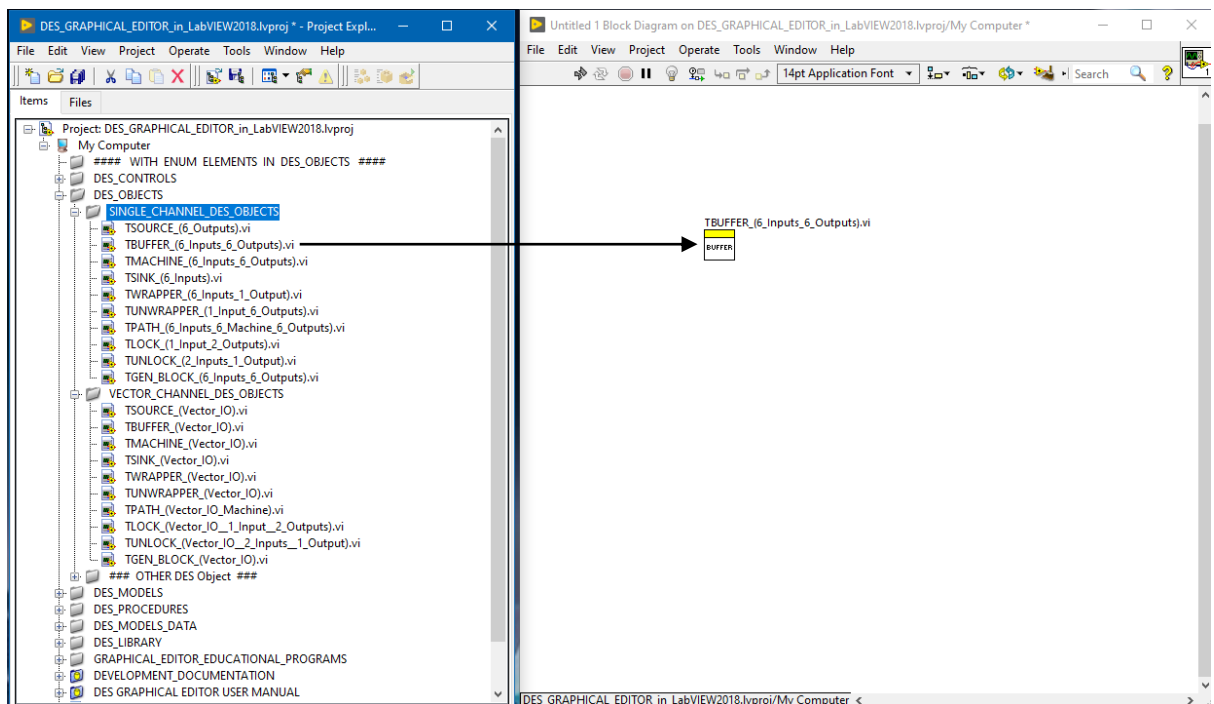


Figure 1.2.1.2 Displays the TBUFFER object in the Diagram Panel window.

If we add input and output connection variables to this icon to create a unique object, we have created an element for the DES model that we can use to perform DES calculations later (**1.2.1.3**).

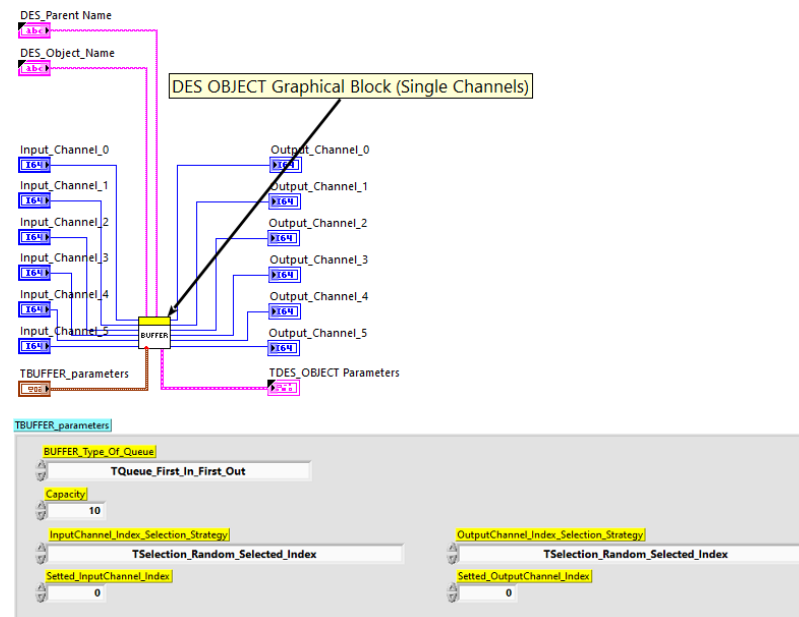


Figure 1.2.1.3 TDES_OBJECT graphic appearance of the block in Diagram Panel window (with individual inputs and outputs).

The **1.2.1.4** The same object (**TBUFFER**), only now the graphic representation of the object () instead of, we display the points of inputs and outputs of connection points (icon connector). The LabVIEW Help window shows us where to find each parameter of the object.

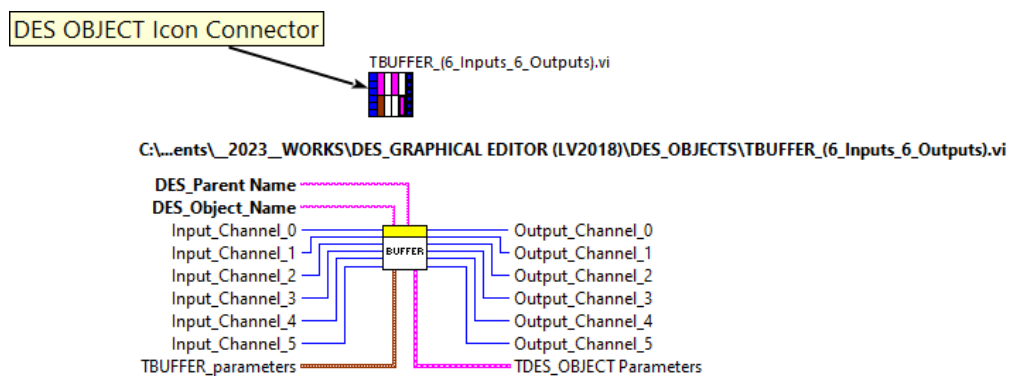


Figure 1.2.1.4 TDES_OBJECT appearance of individual inputs and outputs of the block in Diagram Panel window.

If 6 inputs and 6 outputs are not sufficient when defining objects due to the complexity or large size of our model, then the **VECTOR_CHANNEL_DES_OBJECTS** menu item to select DES. For this object definition format, you can safely apply unique input and output channel numbers (**Figure 1.2.1.5**).

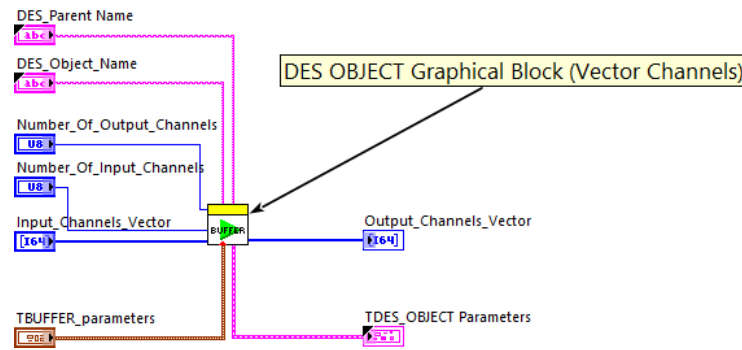


Figure 1.2.1.5 TDES_OBJECT graphic appearance of the block in Diagram Panel window (with vector-type inputs and outputs).

1.2.2 The task of the SOURCE object

We need a DES system element which can create (different) Entity objects.

In DES Python, these are **SOURCE** system components (objects).

Entity objects must be created at a specific time with probability variables and enter the DES simulation system from the **SOURCE** object.

Here are some properties that the **SOURCE** object should have:

- what Entity objects to create (naming, attributes).
- finite or infinite is the number of issues issued by Entities.
- when the first Entity is issued.
- how often the Entity should be issued; what is the property of the probability variable by which the duration of the emission is described (normal distribution, exponential distribution, uniform distribution, triangular distribution, constant value)
- when the next Entity issuance will take place.
- how many outputs the **SOURCE** object has and according to what strategy do you choose which one to pass the new Entity you created.
- what state the **SOURCE** object itself is in (Idle, Busy, Blocked, Failed, Paused); If the **SOURCE** object cannot forward the created new Entity because another DES component connected to its output has not yet completed the operation it is currently dealing with, it will be blocked. This means that from this state, when the next Entity is created, no new Entity will be created.

Source1_parameters

SOURCE_Name_Of_Produced_Entity_str Created_Entity_Name	SOURCE_Distribution TDistribution_Constant_Value	SOURCE_Maximum_Of_Time 0:00:00:03.000
SOURCE_First_Time_of_Entity_Creation 0:00:00:00.000 day:hour:minute:second.xxx	SOURCE_Constant_Value_Of_Time 0:00:00:01.000 day:hour:minute:second.xxx	SOURCE_Mean_Of_Time 0:00:00:01.000
SOURCE_Maximum_Batch_Size 2000000000	SOURCE_Deviation_Of_Time 0:00:00:01.000 day:hour:minute:second.xxx	SOURCE_Usual_Of_Time 0:00:00:02.000
Capacity 1	OutputChannel_Index_Selection_Strategy TSelection_Random_Selected_Index	SOURCE_Minimum_Of_Time 0:00:00:01.000 day:hour:minute:second.xxx
A TSOURCE-ban egy időpontban létrehozott Entitások darabszámát a Capacity paraméterrel lehet beállítani.		
Setted_OutputChannel_Index 0		

Figure 1.2.2.6 The (minimum) set of input parameters of the SOURCE object.

1.2.3 The task of the SINK object

In DES simulation system, you need a system component that can remove Entity objects from the simulation model.

In DES Python, these are **SINK** system components (objects).

The **SINK** object examines the Entity object it receives as input for additional Entity objects and any Entities that are extracted in this way, if it contains only Entities that no longer contain other Entities. The resulting Entity list removes all items from the simulation system (destroy des objects).

Here are some properties that the **SINK** object should have:

- how many Entity objects were removed by the **SINK** object.
- whether removed Entities need to be stored for further processing.
- each contained Entity object should also be dumped, or only the highest-level Entity object; (Only the car Entity object, or all parts in it are Entities.)

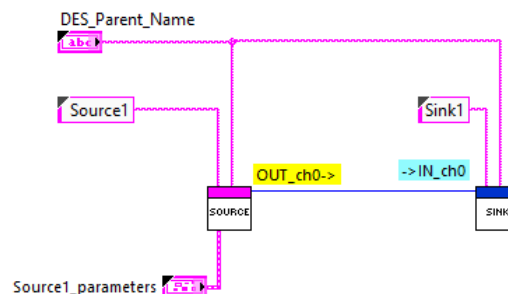


Figure 1.2.3.7 Model implemented with SOURCE and SINK objects

By connecting them in series with these two DES constituents, we could already create a very simple DES process, but this would not make sense, because this would happen in the case of our sample examples.

1. Our customer enters the store at a specified time and then immediately leaves the store without making any purchases.
2. In the car manufacturing sample example, all parts are created, but the car is removed from the assembly process without assembly as a set of parts.
3. And in our information packet forwarding example, as soon as the information packet appeared, we would remove it immediately, which means that it didn't get anywhere and so we didn't get any information that it was born and existed at all.

Each object in the model shown in the Figure has a **DES_Parent_Name** with an input property that is like for people's family names.

The other parameter that identifies the DES object is **DES_Object_Name**, which are used in humans we call you a first name.

On the **Figure 1.2.3.7** **DES_Parent_Name** is not directly visible, but DES objects are named after: Source1 and Sink1 are displayed with constant values.

With these two input properties, we can create a unique name for each DES object!

In many cases, **DES_Parent_Name** refers to a larger unit of which there are several and whose structure is similar or identical. In this case, we can make a subroutine of the larger unit and distinguish the different units by different values of the **DES_Parent_Name**. Example: a company producing incandescent lamps has several production lines, all of which are built from machines of

the same (or nearly identical) type. The individual production lines are distinguished by the **DES_Parent_Name**, while the machines in each production line can be identified by the **DES_Object_Name**.

1.2.4 The task of the MACHINE object

The DES simulation system element that performs tasks that delay the progress of the Entity object in the simulation system for a specified period. The period during which the task will be performed.

In DES Python, these are **MACHINE** system components (objects).

Entity object in MACHINE object delayed by a specified period of probability variables in the DES simulation system using the MACHINE Object.

Here are some properties that the **MACHINE** object should have:

- how many inputs the **MACHINE** object has and according to what strategy it chooses from which one it takes over the Entity in it.
- the intervals at which the Entity should be released; what is the property of the probability variable by which the duration of the delay is described (normal distribution, exponential distribution, uniform distribution, triangular distribution, constant value)
- when the next Entity issuance will take place.
- how many outputs the **MACHINE** object has and according to what strategy it chooses which one to pass the forwarded Entity to.
- what state the **MACHINE** object itself is in (**Idle**, **Busy**, **Blocked**, **Failed**, **Paused**); If the **MACHINE** object cannot forward the Entity because another DES component connected to its output has not yet completed the operation it is dealing with, it will be blocked.

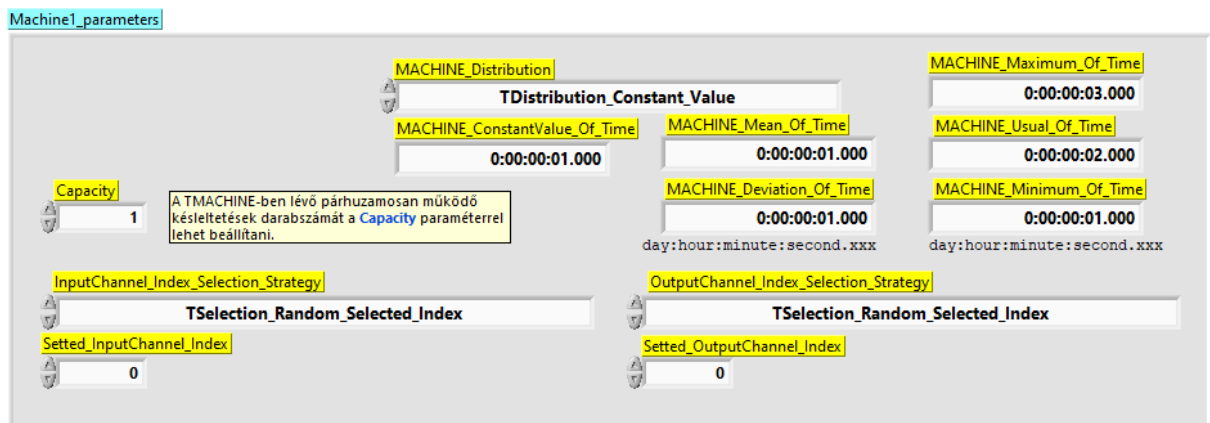


Figure 1.2.4.8 The (minimum) set of input parameters of the MACHINE object.

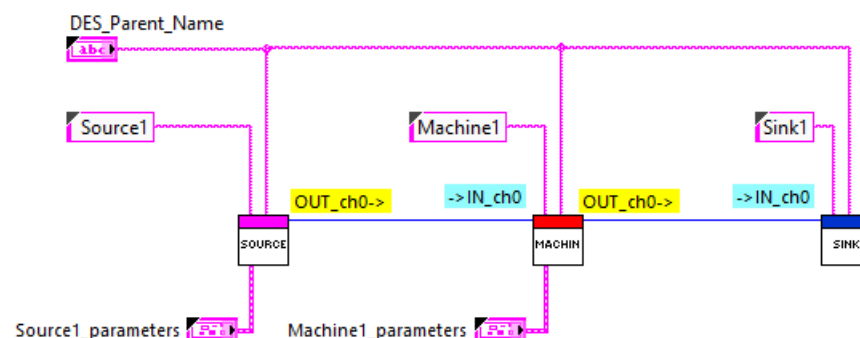


Figure 1.2.4.9 Model implemented with SOURCE MACHINE and SINK objects (DES_Python_User_Manual_002_SOURCE_MACHINE_SINK (SubVI).vi)

The DES model, created by connecting the **SOURCE MACHINE** and **SINK** system components in series, is the simplest layout with which we can model, for example, equipment failure and the time needed to repair a failure. The timing of the **SOURCE** object (időtartam_source, időzítés_típusa_source {normal distribution, exponential distribution, uniform distribution, triangular distribution, constant value}) can be used to model the time between failures. The **Entity** that exits the **SOURCE** object remains in the **MACHINE** object for as long as the **MACHINE** object is set (timestep_machine, distribution_machine {normal distribution, exponential distribution, even distribution, triangular distribution, constant value}). The **MACHINE** object can be used to model the time needed to resolve the malfunction. When Entity exits the **MACHINE** object, troubleshooting is complete, and the failure process and handling are complete. After that, Entity enters the **SINK** object and completes (closes) the system failure process and exits the model.

1.2.5 The task of the BUFFER object

The DES simulation system has a temporary Entity storage system element that can store the maximum number of Entities specified by the capacity property.

Entities are stored only temporarily and sent to system components linked to its outputs as soon as possible for the first time. The object is used to manage the difference in flow rates of entities between two system components. It has the property of connecting two mechanical moving elements with a spring, where the transmission of motion by a factor dependent on the rigidity of the spring occurs more slowly than if the two systems were rigidly connected.

In DES Python, these are **BUFFER** system components (objects). Entity objects are temporarily stored in **BUFFER** object, and as soon as possible, with the help of another event, they proceed further and the **BUFFER** they move to a system element linked to the output of an object.

Here are some properties that the **BUFFER** object should have:

- how many inputs the **BUFFER** object has and according to what strategy it chooses from which one it takes over the Entity contained in it.
- according to what strategy the **BUFFER** object selects which of the Entities stored in it will be placed in the exit position {First in First Out strategy, Last in First Out strategy, etc.}
- how many outputs the **BUFFER** object has and according to what strategy it chooses which one to transfer the Entity contained into.
- how many Entities have been stored by the **BUFFER** object so far during the simulation; (how much its full capacity was used)

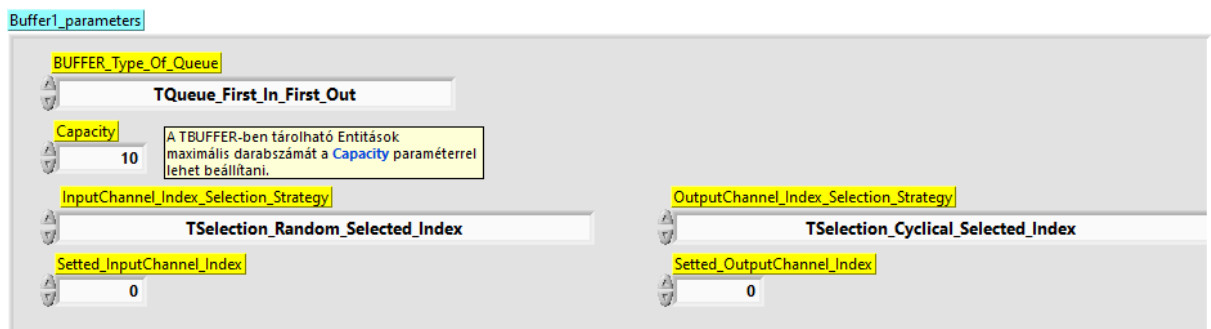


Figure 1.2.5.10 The (minimum) set of input parameters of the BUFFER object.

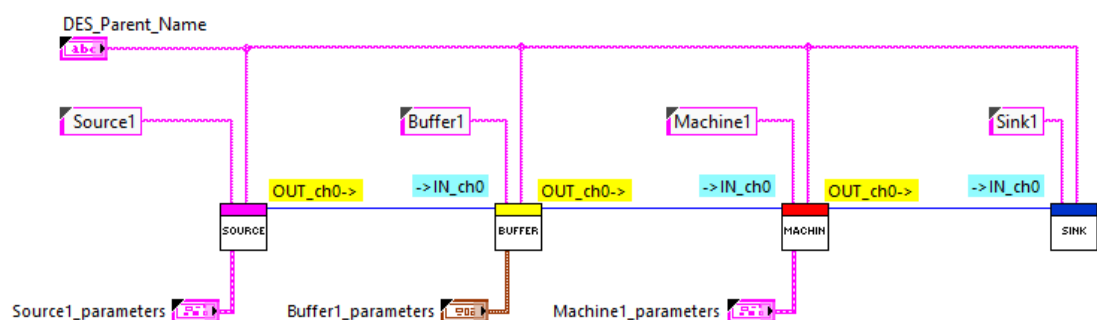


Figure 1.2.5.11 The Model implemented with SOURCE BUFFER MACHINE and SINK objects (DES_Python_User_Manual_003_SOURCE_BUFFER_MACHINE_SINK (SubVI).vi)

The DES model, created by daisy-chaining the **SOURCE BUFFER MACHINE** and **SINK** system components, is the simplest discrete event process model that allows **SOURCE** and **MACHINE** to have different types and values of time delays. The difference between time delays is compensated by the **BUFFER** element, which stores Entity objects created faster by **SOURCE** until **MACHINE** (after completing its previous task) can process another Entity.

Placing a **BUFFER** object in front of a **MACHINE** object implements a so-called "queuing model". In principle, in a DES simulation model, each **MACHINE** object should have a **BUFFER** object waiting for service.

If you do not place a **BUFFER** object in front of the **MACHINE** object, the role of buffering is taken up by the DES system element in front of the **MACHINE** object (connected to its input) and ensures the storage of the next Entity.

The **BUFFER** object has a property (attribute) called **Capacity** that specifies how many Entities the **BUFFERs** object can store. If a **BUFFER** object is full, i.e., contains several Entities corresponding to its capacity, it will "close" its inputs and will not allow any more Entities into its internal storage.

Entities stored in the **BUFFER** object can have different numbers and values of attributes, including an attribute that specifies the importance of the Entity (priority data), which determines, for example, with of the incoming Entities in **BUFFER** is sent first.

1.2.6 The task of the WRAPPER object

In the DES simulation system, it is often necessary to solve tasks called packaging Entities or package transport tasks.

For these tasks, one type of Entity implements the **Package** role, while another type of Entity implements the object to be **packaged**. For a simple example, a cigarette pack is an Entity to pack, and cigarette fibers are Entities to be packed.

In DES, an object is required that can store other Entities and treat the package and its contents as a single unit (Entity object). The need to pack Entities at any depth in a DES simulation system is a basic requirement!

For example, think of assembling a car, where only the car Entity is carried through the assembly process, but the components installed in the car can contain part Entities wrapped in the same way.

In DES Python, these are **WRAPPER** system components (objects). Entity objects are "wrapped" in the **WRAPPER** object into an entity object of type package. The **WRAPPER** object inputs can be used to specify how many Entities are expected for an entire package on that input.

The **WRAPPER** object has only one output through which the package entity leaves the constituent.

Here are some properties that the **WRAPPER** object should have:

- how many inputs the **WRAPPER** object has.
- the **WRAPPER** object has only one output.
- how many Entities are expected to arrive at each input that determines the composition of the packet (input parameter).



Figure 1.2.6.12 The (minimum) set of input parameters of the WRAPPER object.

That **Figure 1.2.6.12** **WRAPPER** objects have 6 inputs, and for the first three we prescribe quantities to be packaged, and for the last three inputs we prescribe 0 (zero) bundled quantities.

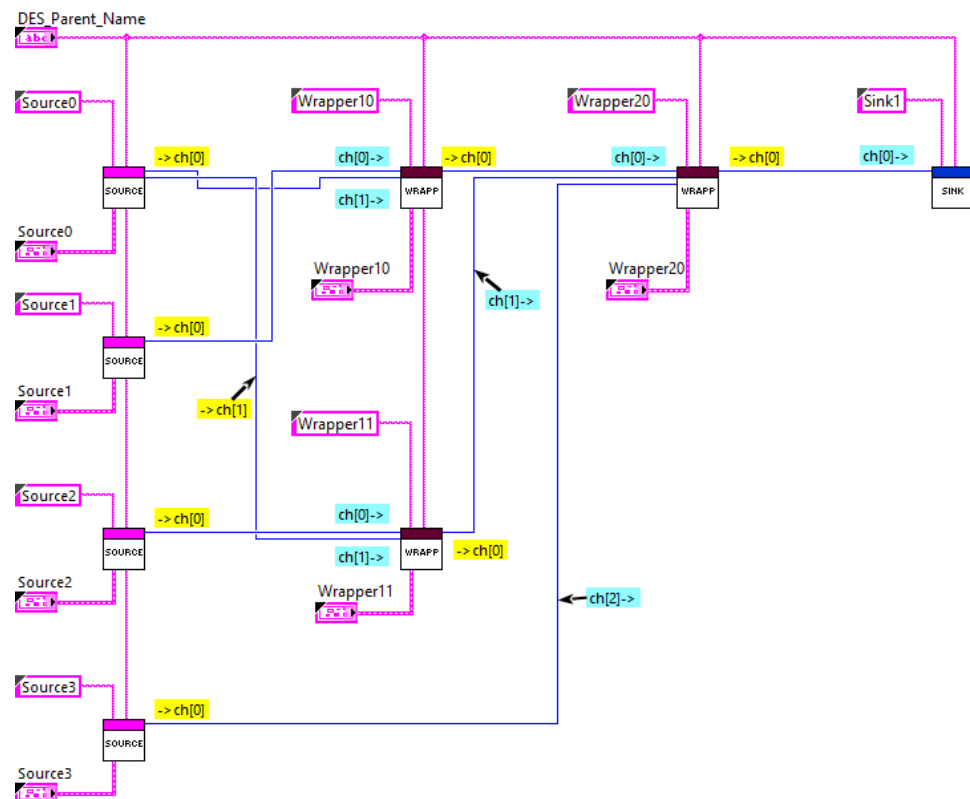


Figure 1.2.6.13 Model implemented with SOURCE and WRAPPER objects
(DES_Python_User_Manual_004_SOURCE_WRAPPER_SINK (SubVI).vi)

The **Figure 1.2.6.13** to interpret the model shown in Fig. we need to know that the **WRAPPER** object first input (input with index 0), where we expect the packet Entity object. Until the package object arrives, the packaging process cannot begin, because there is nowhere to pack the incoming Entity objects to be packaged.

For this model, where everything **WRAPPER** object has 6 inputs, the **Figure 1.2.7.14**. In the vector structure shown in the Figure, we can specify how many Entities we expect to be packaged on each input.

These vector structures can be found in the vector data structures **Wrapper10**, **Wrapper11**, and **Wrapper20** specified as input parameters for **WRAPPER** objects.

1.2.7 The task of the UNWRAPPER object

In the DES simulation system, packaged Entities sometimes need to be unpacked as the reverse operation of packing.

This is especially necessary for transport tasks, when we create packages from individual component Entities, transport them from one place to another using a means of transport, and then unpack them to the destinations so that we can use them (in the model) for further tasks. With a simple example, several packages placed on a pallet are picked at the destination (the contents of the pallet are unpacked) and then the empty pallet can be reused in another part of the DES model.

Here are some of the properties that the **UNWRAPPER** object should have:

- the **UNWRAPPER** object has only one input.
- how many outputs the **UNWRAPPER** object has.
- the **UNWRAPPER** object has no input parameters.

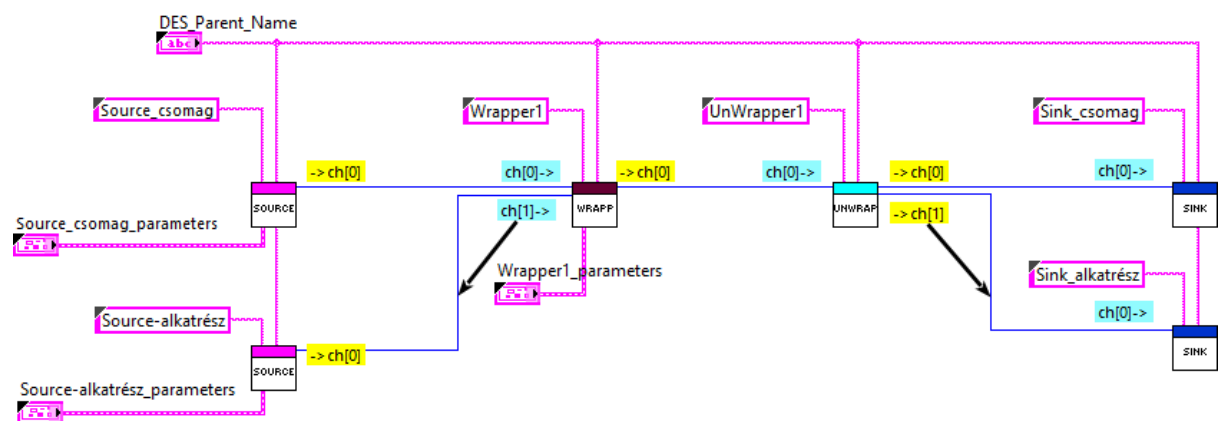


Figure 1.2.7.14 Model implemented with SOURCE WRAPPER and UNWRAPPER objects
(DES_Python_User_Manual_005_SOURCE_WRAPPER_UNWRAPPER (SubVI).vi)

The **Figure 1.2.8.16** in the case of the model shown in the Figure, the **Source_csomag SOURCE** object is used to receive package entities, timing, and other parameters from the **Source_csomag_parameters** input record structure. The parts to be packed are **Source_alkatrész SOURCE** object into your simulation model, their parameters are set by **Source_alkatrész_parameters** record structure. The **Wrapper1** named **WRAPPER** object in the **Wrapper1_parameters** to read how many parts you need to package into the package Entity. The packaged part Package Entity exits the **WRAPPER** object and enter the **UNWRAPPER** Object. That **UNWRAPPER** object is being disassembled, each entity system contains as an attribute which input channel it received for the wrapping operation. That **UNWRAPPER** object then directs each Entity to the appropriate output channel, thus realizing decompression.

In our model, unpackaged Entities are removed from the DES simulation system by two **SINK** objects.

1.2.8 The task of the PATH object

In a DES simulation system, Entities typically use DES objects (system elements) to introduce the Entity into the operation object through an input channel. Then, the required action (delay or staging) is performed in the DES component, and the entity leaves the operation object on one of the output channels.

The **PATH** constituent implements a constituent that performs the following task by connecting them together as a subroutine using the basic constituents described above.

Car Entities arriving at inputs to the PATH object can travel simultaneously but at different speeds on the highway using a multilane highway. Due to different speeds, they cover the same distance in different periods of time. *The PATH or path component handles the Entities arriving at its inputs in parallel (at the same time) in all car lanes of the PATH constituent (called **Path Number of Track in the program**).*

A constituent delay not only one Entity, but all (more than one) Entities received at its inputs.

The **PATH** constituent is derived from the **BUFFER** constituent by defining the parameters for running along the path and the total delay time (**Total_Delay_Time**) calculated from the input parameters of the **BUFFER**.

The **PATH** so, as a constituent, there is a **BUFFER** parameter list **Figure 1.2.8.15** and a list of PATH parameters **Figure 1.2.8.16**.

Buffer1_parameters

Parameters shown in Figure 1.2.8.15:

- BUFFER_Type_Of_Queue**: TQueue_First_In_First_Out
- Capacity**: 10 (Note: A TBUFFER-ben tárolható Entitások maximális darabszámát a Capacity paraméterrel lehet beállítani.)
- InputChannel_Index_Selection_Strategy**: TSelection_Random_Selected_Index
- Setted_InputChannel_Index**: 0
- OutputChannel_Index_Selection_Strategy**: TSelection_Cyclical_Selected_Index
- Setted_OutputChannel_Index**: 0

Figure 1.2.8.15 The (minimum) set of BUFFER input parameters of the PATH object.

TPATH_CONTROL_parameters

Parameters shown in Figure 1.2.8.16:

- PATH_Length [m]**: 10,000
- PATH_Length_Calculate_by_Position_bool**: NO
- PATH_Acceleration [m/s**2]**: 1,000
- PATH_Constant_Velocity [m/s]**: 1,000
- PATH_Retardation [m/s**2]**: -1,000
- PATH_Need_Parameter_Recalculation_bool**: NO
- PATH_Number_of_Tracks [1]**: 6
- PATH_Total_Delay_Time [s]**: 10,000
- PATH_Length_Calculate_Mode**: Line Distance Calculation

Start_Position [m]	End_Position [m]
X_Position: 0	X_Position: 0
Y_Position: 0	Y_Position: 0
Z_Position: 0	Z_Position: 0

Figure 1.2.8.16 The (minimum) set of input parameters of the CONTROL object of the PATH object.

Aside from the details of the delay calculation, the **PATH CONTROL** parameters can be used to determine the total delay duration of the route (**Path_Total_Delay_Time**). By setting this

duration and the type of probability variable of delay, the **Figure 1.2.8.17 MACHINE** system component, we can prescribe the following delays.

- constant delay with the total delay duration of the specified route, in this case all vehicles are the **PATH** system component in different car lanes.
- In the case of normally distributed delay, vehicles shall travel the distance modelled by the **PATH** constituent at a mean speed (Mean) over a period determined by a defined standard deviation.

In addition, many other velocity probability variables can be created using the probability variables available in the program, but most importantly, not only one Entity but several Entities corresponding to the maximum number of car lanes in the **PATH** can travel the same route from point A to point B at the same time.

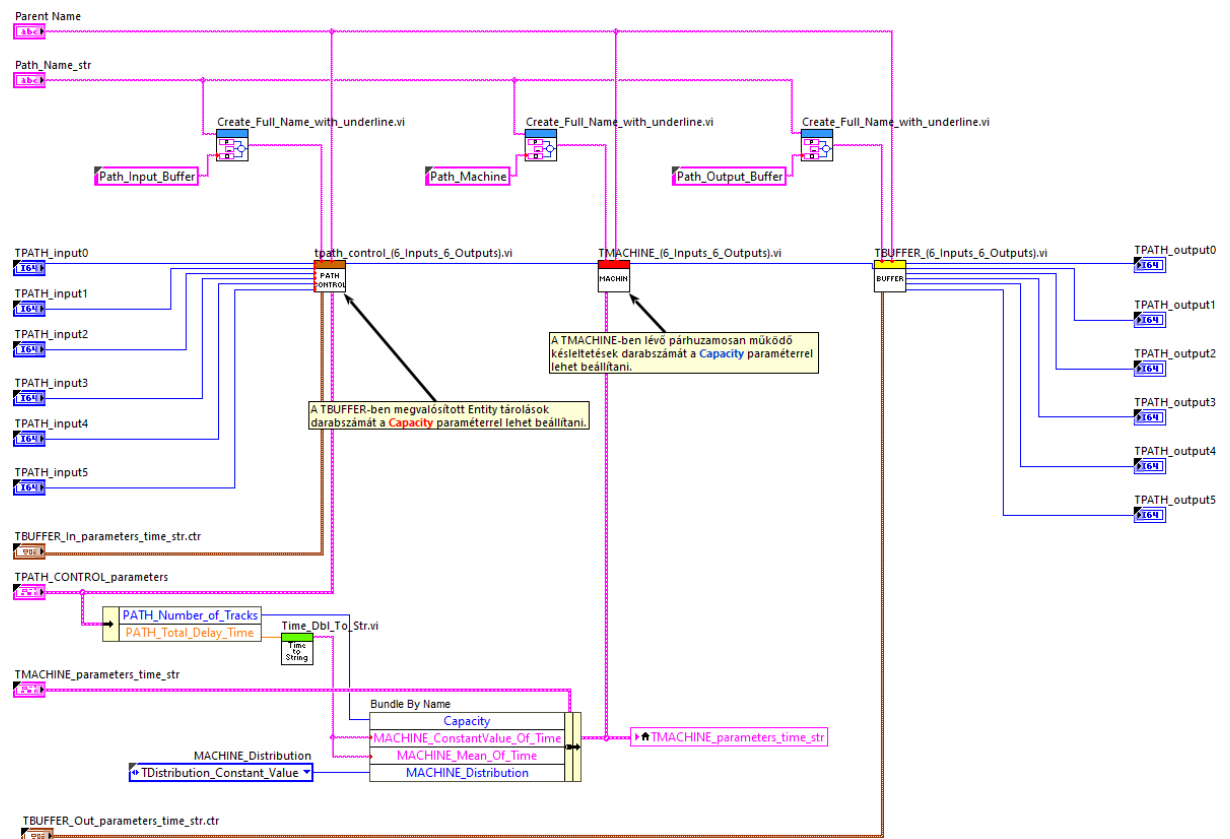


Figure 1.2.8.17 Subroutine of the PATH object, which contains SOURCE PATH and MACHINE objects (TPATH_(6_Inputs_6_Machine_6_Outputs).vi)

At the end of the **Entities'** "PATH journey", a **BUFFER** component "collects" and transmits Entities exiting the multilane highway to the DES model. It's like a multi-lane highway at the end of the highway continuing with a single-lane route, and vehicles that used to be running parallel to each other must sort one after the other to be able to drive on the single-lane highway.

1.2.9 Tasks of LOCK and UNLOCK objects.

In the DES simulation system, Entities in DES models can cause cases where Entities stored in constituents cannot proceed further in the DES model because they have occupied all possible space in the system components. This phenomenon is called deadlock.

In the simulation model, it must be ensured that there is no clutter of system components with Entities in each region of the model, there are always some empty spaces where Entities can proceed.

The **LOCK** and **UNLOCK** system components combine to solve this task. The **LOCK** system element, formed from a **MACHINE** system element, ensures that the Entities passing through it cannot exceed a certain number of preset pieces. That is, only a certain number of Entities can reside in each region of the model. If the number of Entities passed through has reached this set limit, the **LOCK** constituent will not allow any further Entities to enter the region. Of course, Entities that have completed all tasks and wish to exit the given model region must pass through the **UNLOCK** system component. The **UNLOCK** constituent is related to the pair of **LOCK** components at the input point of the region, and when an Entity exits the region, it sends a message to its **LOCK** counterpart that an Entity can be allowed into the region. This ensures that only a maximum number of entities can reside in the DES model region when you run the DES model.

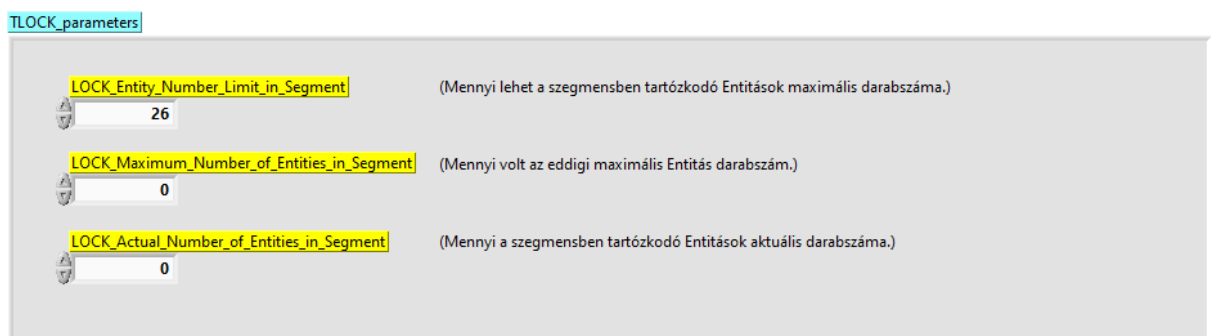


Figure 1.2.9.18 The (minimum) set of input parameters of the CONTROL of the LOCK object.

The **UNLOCK** system component has no input parameters. The first input channel receives the Entities passing through it, while the input of the second is connected to the second output of the **LOCK** system element operating in pairs with it.

The **LOCK** constituent accounts for the Entities passing through its first output and closes the first output when their number reaches Lock Entity Number Limit in Segment.

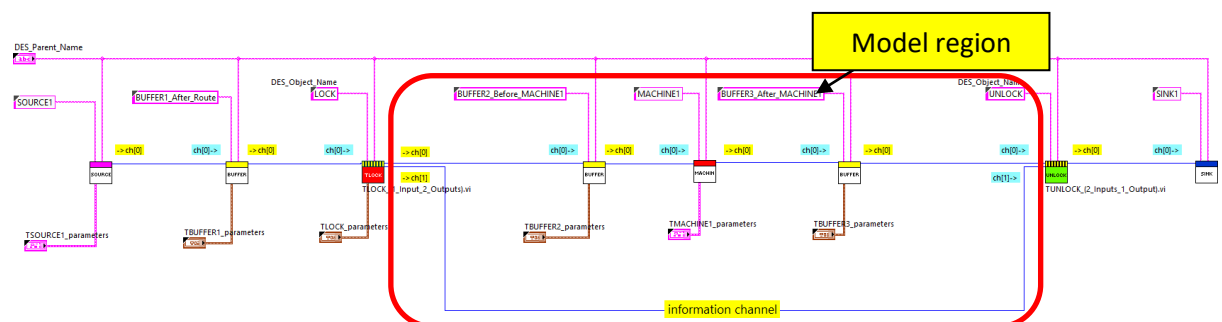


Figure 1.2.9.19 A program for the LOCK-UNLOCK object pair containing SOURCE BUFFER MACHINE and SINK objects

1.3 How do I move Entities between DES objects?

A DES simulation model consists of *DES objects* (**TDES_OBJECT**) and *transport objects* (**TDES_CHANNEL; TDES CONNECTION**) connecting them together.

The creator of the DES model ONLY NEEDS TO SPECIFY (ONLY) THESE OBJECTS (their definition and parameters), ALL FURTHER OPERATIONS ARE PERFORMED BY THE DES PYTHON FRAMEWORK!

When you run the DES simulation model, Entities migrate sequentially through the model to DES objects that perform various operations. At the input and output of DES objects, they arrive at a unit (object) called a channel, and then, when the DES object becomes capable of performing the operation (completed the previous task), it reads the Entity from the channel and performs the required action. When the DES object finishes performing its required action, it places the entity in one of the output channels of the DES object. From the output channel, a DES Python command moves the Entity to the input channel of another DES object. The relationship between output and input channels can be described by the **TDES_CONNECTION** object.

A *channel* object (**TDES_CHANNEL**) is like a small box into which you can place or remove a piece of Entity (**TDES_ENTITY**) object placed within it. The Entity is still in the input channel only in the vestibule of the DES object, or if it has already exited the DES object when it is in one of the output channels.

In addition to the Entity object, a channel object has properties that let you determine which object it belongs to, what type of input or output channel it belongs to, and many other properties.

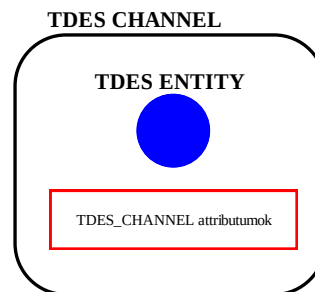


Figure 1.3.20 Building a TDES_CHANNEL object

Channel objects (**TDES_CHANNEL**) are used as input and output channels for DES objects (**TDES_OBJECT**), in which we can place Entity (**TDES_ENTITY**) objects until further processing. Entities placed in input channels wait in that input *channel* until their parent object is sent to the internal Entity store of the DES object in one of the update steps of the DES object.

Similarly, an Entity that has passed through DES object operations *is placed in one of the output channels* so that a move between DES objects takes it to the input channel of another DES object and waits there for further processing.

So, channel objects are DES objects that provide input and output staging storage and perform (staging) storage of Entities for that DES object.

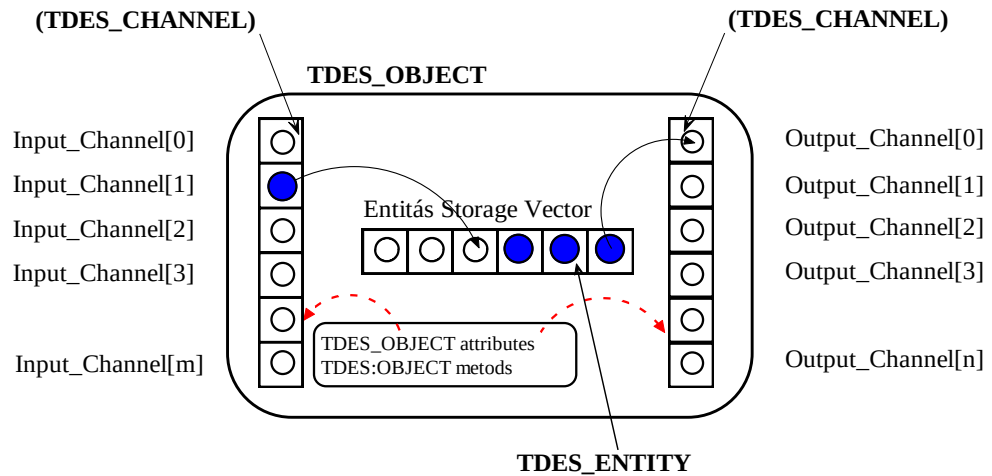


Figure 1.3.21 TDES_CHANNEL objects as elements of TDES_OBJECT

*An output channel object can be linked to an input channel object by using the connection object **(TDES_CONNECTION)**.*

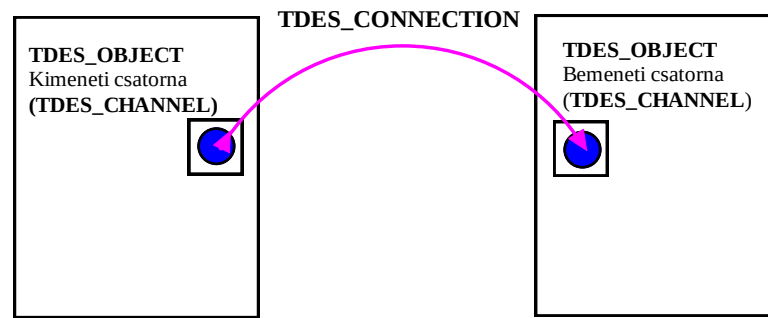


Figure 1.3.22 The TDES_CONNECTION object that connects TDES_OBJECT elements

Using the properties of the connection object (**TDES_CONNECTION**), we can determine how many ordinal output channels of which DES object is connected to the input channel of another (or own) DES object, for which we must specify its sequence number (index).

The Entity is moved from one output channel to the input channel of another DES object using the **TEntity_Move_Request** DES Python command, which is a DES command executed at a specified time. This DES command is (typically) prescribed by the DES object that placed the Entity in the output channel. If the conditions for Move Entity are correct when you execute the **TEntity_Move_Request** command, the Entity is moved.

What are these conditions under which an Entity is moved:

- Make the input channel of the DES object empty where the Entity move occurs.
- In addition, the output channel of the DES object from which the movement will be made must contain an Entity. Sometimes the entity has been moved before, but the command to move it remains in the list of tasks (**TDES_TASKLIST**). In this case, we cannot move the Entity and the command must be deleted.

So, as the Entity migrates between DES objects, it arrives at the input channels of the various DES objects, and then, when the owner of the input channel (DES object) moves and processes the Entity in the DES object and completes all operations, places it in the output channel of the DES object and issues a **TEntity_Move_Request** command. If the conditions for moving Entity are successful when the command is executed, the Entity is moved.

To successfully continue the simulation of the DES model, we issue a **TDESOBJECT_Next_State** command to each DES object from which we moved the Entity and into which we moved the Entity to update their state when moving the DES object, and to update its state.

1.4 What is TaskList and why is it needed?

A job list (**TDES_TASKVECTOR**) is an indexed list of tasks (TDES_TASK) (vector).

The task (**TDES_TASK**) is described with a record whose key elements are:

- The date of execution of the **TDES_Task** required in the simulation system.
- Name the DES object that sent the command.
- The type of DES object that sent the command.
- The name of the command that must be executed at the specified time.
- The index of the output channel of the DES object sending the command.

These tasks (**TDES_TASK**) are stored in ascending order according to their execution date and executed in the DES simulation model, which are then executed in chronological order. Of course, when performing each task, additional tasks may arise, which also have an execution date. Newer tasks should be added to the list of tasks based on when they were completed. If you find a task that matches the execution time of the new task, place the new task at the end of the series of tasks that have the same time.

As a sample, we present a list of tasks (**DESBranch_TaskList**) generated during the running of a simulation model and shows how each task is arranged chronologically:

The Figure shows that the type of tasks to perform (**Command**) is basically updating the state of DES objects (**TDESOBJECT_Next_State**) and moving entities in channels from one DES object to another DES object (**TENTITY_Move_Request**).

That **Figure 1.4.23** the Figure also shows the state of each DES object (**State**) to indicate that the DES object is working on a task (Busy) or is being applied to start another task because it is doing nothing (**Idle**)

Content specifies the number of identifiers (**ID_Number**) in the input channels, internal Entity container, and output channels of a DES object. An "x" indicates that the channel with that number does not contain an Entity.

```
Model_16.Print_DESBranch_TaskList:
=====
Number of DES_Tasks = 13
GTime_Now [DDD:HH:MM:SS.XXX] = 2d:00h:01m:15.223s
=====
```

```
Model_16.DESTaskList [ i ] = TaskTime      Sender_Name      DESObject      Command      State      Content
                                _Type
```

```

=====
Model_16.DESTaskList [ 0] = 2d:00h:01m:15.223s Path1_Path_Machine TMACHINE TDESOBJECT_Next_State TBusy >x,x,x,x,x,x,#3473,x,x,x>-[#3474,#3476,#3475]->#3472,x,x,x,x,x,x,x>
Model_16.DESTaskList [ 1] = 2d:00h:01m:15.223s Path1_Path_Machine TMACHINE TDESOBJECT_Next_State TBusy >x,x,x,x,x,x,#3473,x,x,x>-[#3474,#3476,#3475]->#3472,x,x,x,x,x,x,x>
Model_16.DESTaskList [ 2] = 2d:00h:01m:15.223s Path1_Path_Machine TMACHINE TENTITY_Move_Request TBusy >x,x,x,x,x,x,#3473,x,x,x>-[#3474,#3476,#3475]->#3472,x,x,x,x,x,x,x>
Model_16.DESTaskList [ 3] = 2d:00h:01m:15.223s Path1_Path_Machine TMACHINE TDESOBJECT_Next_State TBusy >x,x,x,x,x,x,#3473,x,x,x>-[#3474,#3476,#3475]->#3472,x,x,x,x,x,x,x>
Model_16.DESTaskList [ 4] = 2d:00h:01m:15.223s Path1_Path_Machine TMACHINE TENTITY_Move_Request TBusy >x,x,x,x,x,x,#3473,x,x,x>-[#3474,#3476,#3475]->#3472,x,x,x,x,x,x,x>
Model_16.DESTaskList [ 5] = 2d:00h:02m:09.966s Source1 TSOURCE TDESOBJECT_Next_State TIdle >nil>-[x]->x,x,x>
Model_16.DESTaskList [ 6] = 2d:00h:02m:09.966s Source1 TSOURCE TDESOBJECT_Next_State TIdle >nil>-[x]->x,x,x,x,x,x,x>
Model_16.DESTaskList [ 7] = 2d:00h:02m:09.966s Source1 TSOURCE TDESOBJECT_Next_State TIdle >nil>-[x]->x,x,x,x,x,x,x>
Model_16.DESTaskList [ 8] = 2d:00h:02m:09.966s Source1 TSOURCE TDESOBJECT_Next_State TIdle >nil>-[x]->x,x,x,x,x,x,x>
Model_16.DESTaskList [ 9] = 2d:00h:02m:09.966s Source1 TSOURCE TDESOBJECT_Next_State TIdle >nil>-[x]->x,x,x>
Model_16.DESTaskList [10] = 2d:00h:02m:09.966s Source1 TSOURCE TDESOBJECT_Next_State TIdle >nil>-[x]->x,x,x,x,x,x,x>
Model_16.DESTaskList [11] = 2d:00h:02m:09.966s Source1 TSOURCE TDESOBJECT_Next_State TIdle >nil>-[x]->x,x,x,x,x,x,x,x,x>
Model_16.DESTaskList [12] = 2d:00h:02m:09.966s Source1 TSOURCE TDESOBJECT_Next_State TIdle >nil>-[x]->x,x,x,x,x,x,x,x,x>

```

Figure 1.4.23 The contents of the DESBranch_TaskList object when running a DES simulation model.

1.5 How does a DES simulation start and what makes the simulation progress in time?

In DES Python, we start running the model by updating the state of DES objects that create entities. This is done by the DES simulation framework by selecting DES objects of type **SOURCE** from the `DESBranch_DESObjectList` list of DES model elements and inserting into the list of tasks (`DESBranch_TaskList`) the first Entity issue date of the given **SOURCE** DES object, where it updates the state of that **SOURCE** DES object (`TDESOBJECT_Next_State`).

Thus, if we consider the DES model as a state machine containing elements with large special properties, then we "initialize" the simulation model running with the help of elements with a single initial condition (**SOURCE** objects) in the system.

As described in the previous chapter, at the point in the list of tasks (`DESBranch_TaskList`), the state of **SOURCE** DES objects is updated, resulting in the creation (birth) of a new Entity in the **SOURCE** DES object.

If there are no other obstacles, the created Entity is immediately placed in one of the output channels of that **SOURCE** object. For the given **SOURCE** output channel, we place a command in the list of tasks (`DESBranch_TaskList`) that moves the Entity to another DES object (`TENTITY_Move_Request`) related to the output channel.

What hindrance might there be that would not allow the Entity to move? For example, if the selected channel still has a previously created Entity, you cannot place the newly created Entity there, but must wait until the next state update of the **SOURCE** DES object.

To move Entities that are placed in output channels but may be "stuck" there, as the last update statement of the **SOURCE** DES object, we examine all output channels of the DES object and issue an Entity Move command to each Entity in the list of tasks. This ensures that each output channel of the given DES object is updated to move further.

The **SOURCE** DES object has the specialty of having no inputs, since its task is to create and emit the Entity.

For DES objects that have both input and output channels (**BUFFER, MACHINE**), the state update procedure begins by issuing a data movement command (`TENTITY_Move_Request` for each input channel of the DES simulation system that is connected to the output channel of another DES object.) to pass the Entity in the output channel to the input channel of the DES object being updated.

This procedure initiates the uploading of input channels whenever possible each time a DES object is updated, which additionally includes updating the state of the DES object at both ends of the connection. The same thing happens when you place Entities in output channels when, similarly, you initiate state updates for both objects at either end of the relationship object that connects DES objects. This method may require a DES object state update that no longer performs because the DES object started a task defined at an earlier point in time. The Entities in the input and output channels are updated so that they happen in any case.

This procedure ensures that Entities created in the DES model go through the sequence of DES objects that are assigned to them, and then exit the simulation system using the **SINK** object.

The DES simulation system at run dead end (deadlock) deadlock, which can be detected by running out of tasks from the task list and not creating new tasks as Entities flow between DES objects.

How can this state arise? In such a way that the progress of Entities between DES objects is prevented by an event, DES objects of type **MACHINE** cannot pass on the Entity on which they performed the required operation, and **BUFFER** objects are slowly filling up and can no longer receive more Entities on their input. Similarly, to **SOURCE** objects, if they cannot pass the created Entity to a related DES object, the Entity occupies the output channel and prevents Entity traffic from occurring.

The reason for the deadlock state can be determined by performing the simulation model step by step (per task) and providing for the necessary model modification(s).

The DES Python framework has such tracing step-by-step execution capability!

1.6 What types of networks can we create in DES Python?

In the DES Python simulation system, all basic connections of DES objects can be implemented.

To link DES objects sequentially:

The output channel of each DES object is connected to the input channel of another DES object. The Entity stream then migrates from the DES object named SOURCE_01 to the DES object named SINK_01.

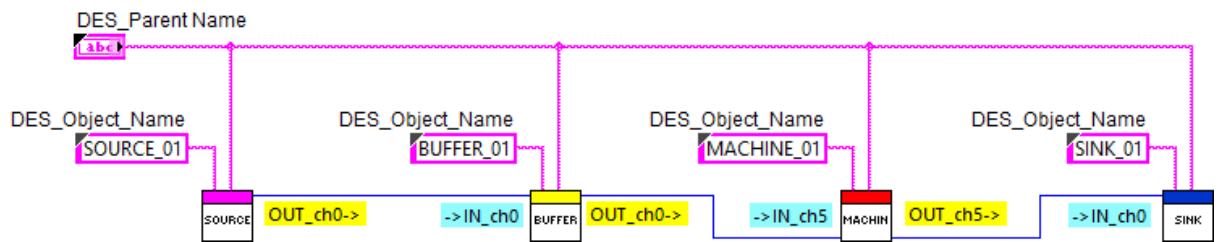


Figure 1.6.24 Serial linking of DES objects.

To switch DES objects in parallel:

In the following example, when DES objects are connected in parallel, three DES objects of type MACHINE are attached to the output of the BUFFER_10 DES object. What decides which output channel of the BUFFER_10 DES object loads it into? The answer is to select the input and output channel of each DES object (if the given DES object has the given channel type) using a procedure. The procedure considers the active channels (which have connectivity) and determines the channel index value based on a selected strategy.

The most used channel index selection procedure is when a channel is randomly (evenly distributed) from the available channels.

Selection is made for input channels that have an Entity and for output channels from those that are empty (no Entity).

When selecting the input channel of the **SINK** DES object, we do not follow this strategy, for this object we read the Entities of all input channels and remove them from the DES simulation. For the **BUFFER** object, we also attempt to read the Entity in all input channels, but the amount read is limited by the **Capacity** property of the **BUFFER** DES object.

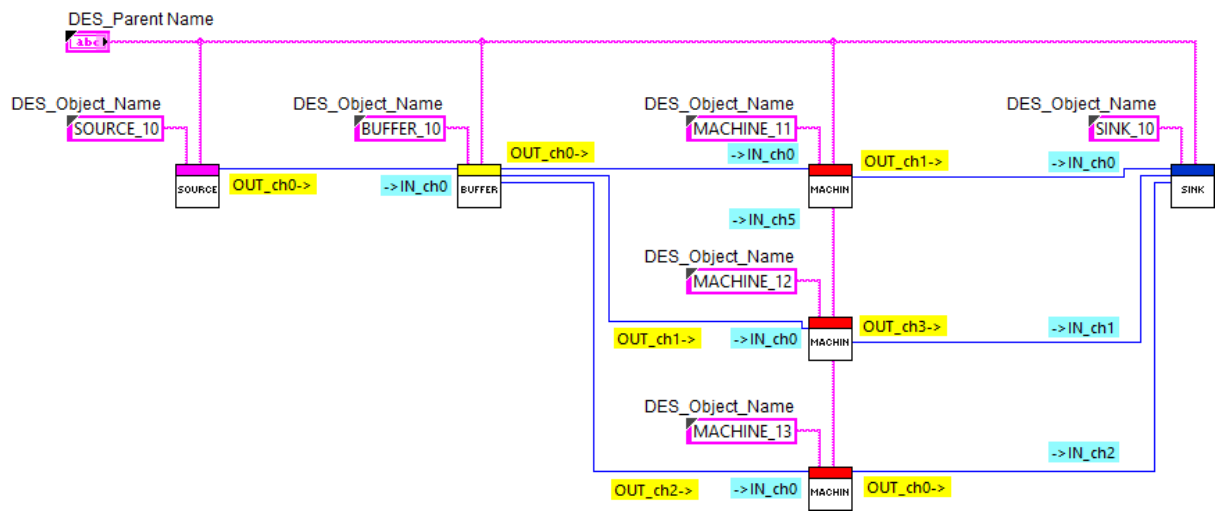


Figure 1.6.25 Parallel linking of DES objects

Loopback links to DES objects:

The following switch shows the feedback loop of input and output channels of DES objects.

The  symbols in the Figure implement the avoidance of the algebraic loop in the coupling, they have no effect on connecting the channels.

The feedback link allows us to "return" the Entity to a state that has already been through it. You can loop back between two DES objects, or you can link the DES object's own output back to its own input.

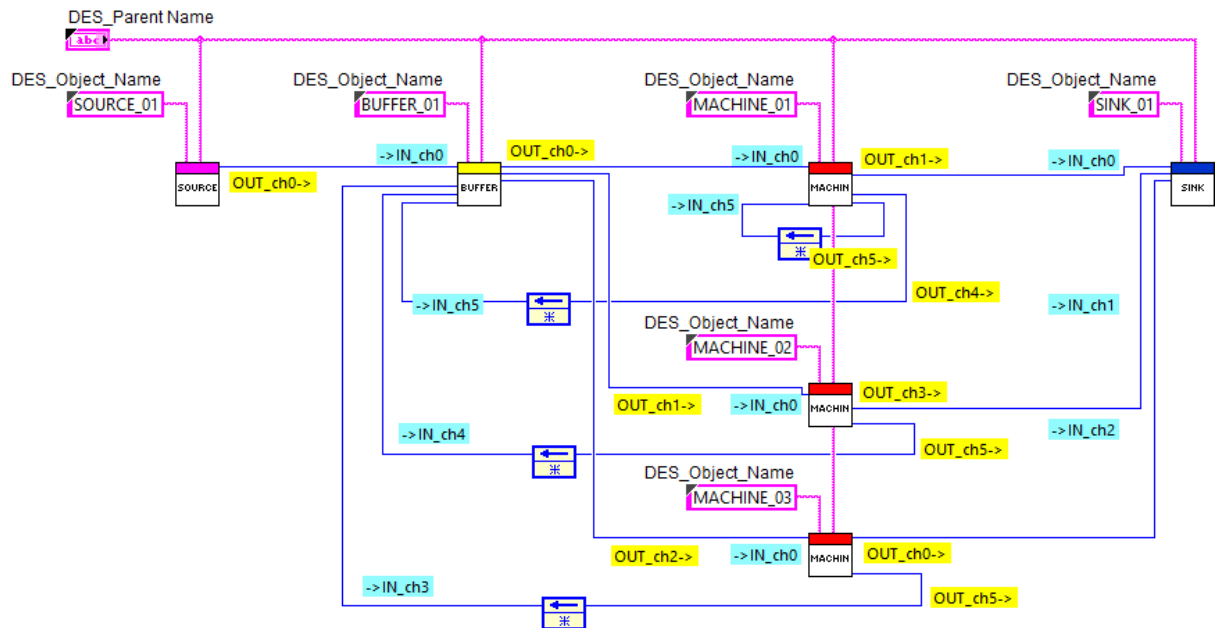


Figure 1.6.26 Loopback linking DES objects.

To connect DES objects in multiple parallel processes:

You can create multiple parallel processes by assigning each process a separate **SOURCE** DES object. The processes created in this way can be serial and/or parallel-linked, between which arbitrary cross-connections can be created using the channels of individual DES objects. The following illustration shows an example.

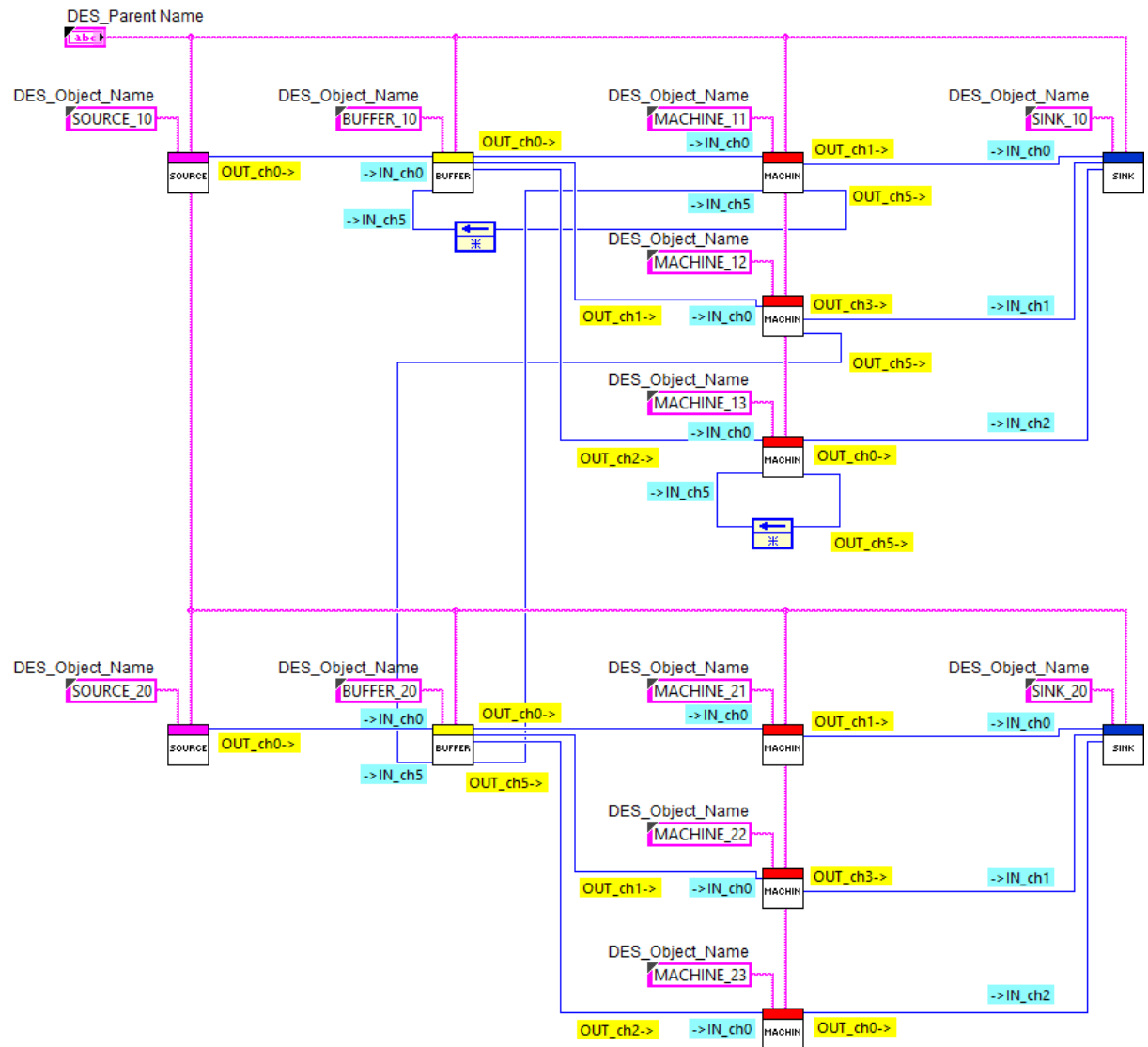


Figure 1.6.27 DES objects are multiple processes running in parallel-in with cross connection of processes.

1.7 What kind of help is there (Graphic Editor) that facilitates comfortable model creation?

For graphical development of DES Python programs, a Graphical Editor has been created in LabVIEW. The following illustration shows the DES objects that you can select from the program project menu.

The **SINGLE_CHANNEL_DES_OBJECT** menu option selects DES objects with 6 input channels and 6 output channels.

The **number** of input and output channels of DES objects in **VECTOR_CHANNEL_DES_OBJECT** is determined by the user. Based on practice, this DES object definition method is used less frequently by model builders.

In the Graphical Editor we create model elements in an extremely simple way by "indenting" and parameterizing DES objects, and then we create a connection between the channels of DES objects in an extremely simple operation. With that, we created the DES Python model.

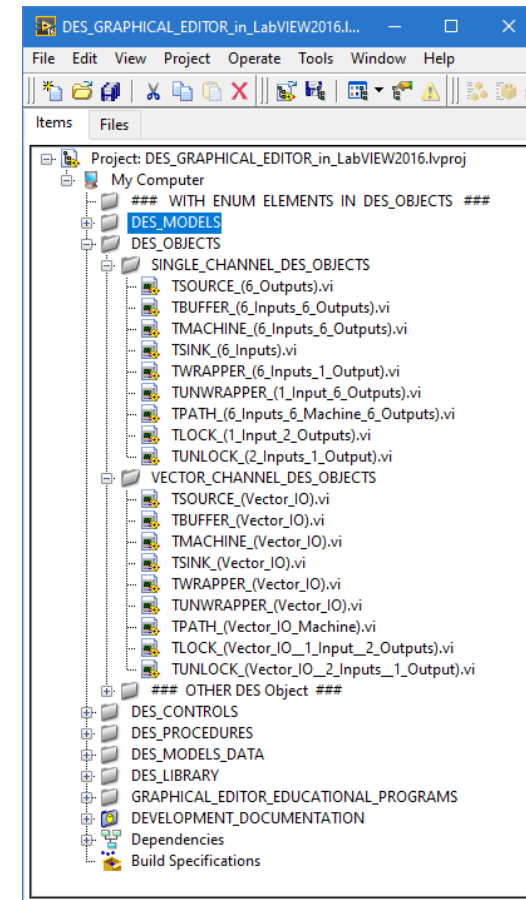


Figure 1.7.28 List of DES objects in DES_GRAPHICAL_EDITOR

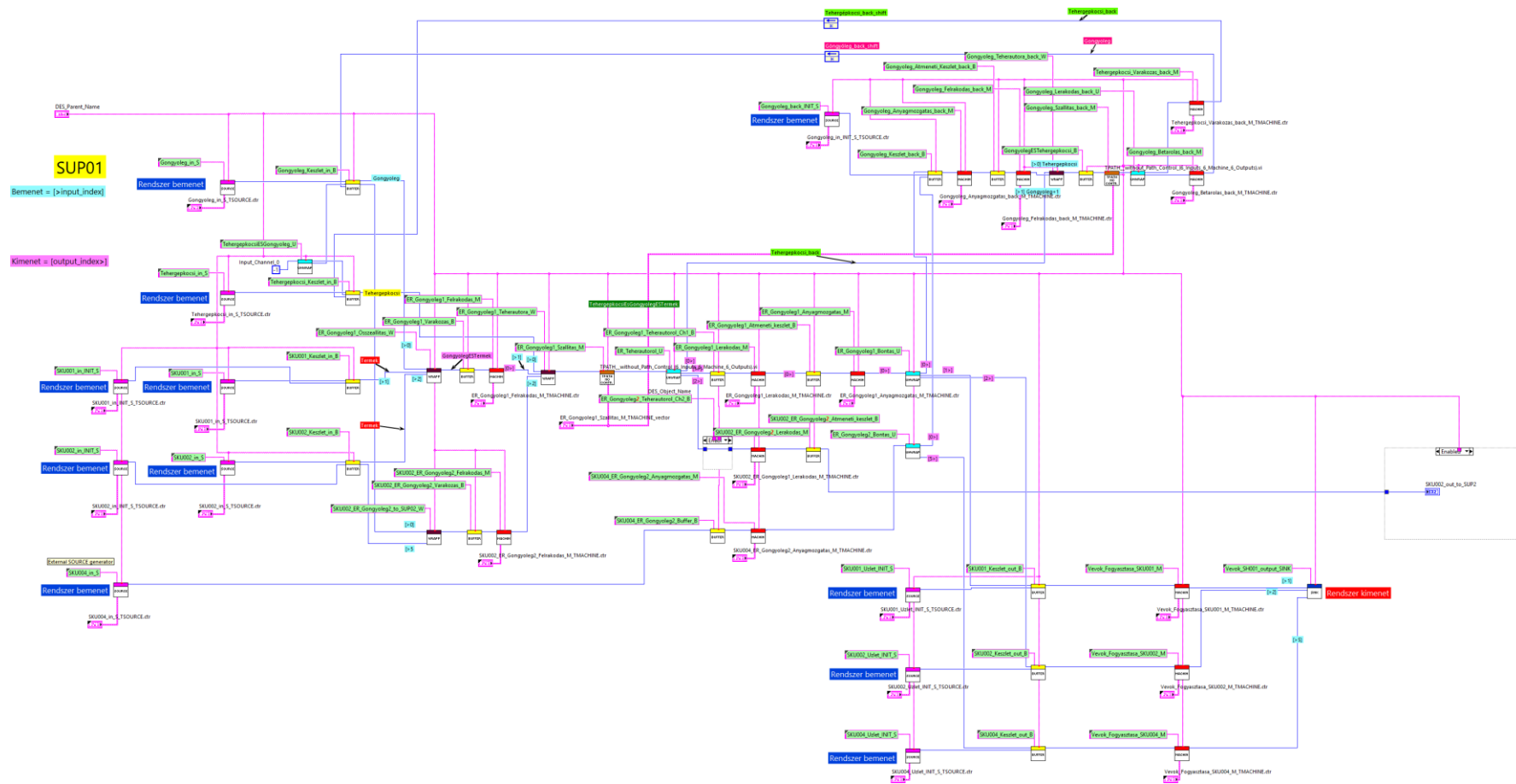


Figure 1.7.29 How to link DES objects in DES_GRAPHICAL_EDITOR

An example of a "slightly more complicated" DES model that can be called as a subroutine as any number in the model, only the ParentName parameter needs to be set to a different value.

Index	ID_Number	ObjectType	ObjectName
0	1	TBUFFER	SUP01_present.SKU004_ER_Gongyoleg2_Buffer_B
1	2	TSOURCE	SUP01_present.SKU004_Uzlet_INIT_S
2	3	TSOURCE	SUP01_present.SKU001_Uzlet_INIT_S
3	4	TSOURCE	SUP01_present.SKU002_Uzlet_INIT_S
4	5	TSOURCE	SUP01_present.SKU002_in_INIT_S
5	6	TSOURCE	SUP01_present.SKU002_in_S
6	7	TSOURCE	SUP01_present.Tehergepkocsi_in_S
7	8	TSOURCE	SUP01_present.Gongyoleg_in_S
8	9	TSOURCE	SUP01_present.SKU001_in_S
9	10	TSOURCE	SUP01_present.SKU001_in_INIT_S
10	11	TSOURCE	SUP01_present.Gongyoleg_back_INIT_S
11	12	TUNWRAPPER	SUP01_present.TehergepkocsiESGongyoleg_U
12	13	TMACHINE	SUP01_present.SKU004_ER_Gongyoleg2_Anyagmozga
13	14	TBUFFER	SUP01_present.SKU002_Keszlet_in_B
14	15	TBUFFER	SUP01_present.SKU001_Keszlet_in_B
15	16	TBUFFER	SUP01_present.Gongyoleg_Keszlet_in_B
16	17	TBUFFER	SUP01_present.Tehergepkocsi_Keszlet_in_B
17	18	TUNWRAPPER	SUP01_present.ER_Gongyoleg2_Bontas_U
18	19	TWRAPPER	SUP01_present.SKU002_ER_Gongyoleg2_to_SUP02_W

Index	ObjectName_OUT	Ch_OUT	ObjectName_IN	Ch_IN
0	SUP02_present.SKU004_ER_Gongyoleg2_Atmeneti_keszlet_B	0	SUP01_present.SKU004_ER_Gongyoleg2_Buffer_B	0
1	SUP01_present.SKU004_ER_Gongyoleg2_Buffer_B	0	SUP01_present.SKU004_ER_Gongyoleg2_Anyagmozgata	0
2	SUP01_present.SKU002_in_S	0	SUP01_present.SKU002_Keszlet_in_B	0
3	SUP01_present.SKU002_in_INIT_S	0	SUP01_present.SKU002_Keszlet_in_B	1
4	SUP01_present.SKU001_in_S	0	SUP01_present.SKU001_Keszlet_in_B	0
5	SUP01_present.SKU001_in_INIT_S	0	SUP01_present.SKU001_Keszlet_in_B	1
6	SUP01_present.Gongyoleg_in_S	0	SUP01_present.Gongyoleg_Keszlet_in_B	0
7	SUP01_present.TehergepkocsiESGongyoleg_U	1	SUP01_present.Gongyoleg_Keszlet_in_B	1
8	SUP01_present.Gongyoleg_Betarolas_back_M	0	SUP01_present.Gongyoleg_Keszlet_in_B	2
9	SUP01_present.Tehergepkocsi_in_S	0	SUP01_present.Tehergepkocsi_Keszlet_in_B	0
10	SUP01_present.TehergepkocsiESGongyoleg_U	0	SUP01_present.Tehergepkocsi_Keszlet_in_B	1
11	SUP01_present.Tehergepkocsi_Varakozas_back_M	0	SUP01_present.Tehergepkocsi_Keszlet_in_B	2
12	SUP01_present.SKU004_ER_Gongyoleg2_Anyagmozgatas_M	0	SUP01_present.ER_Gongyoleg2_Bontas_U	0
13	SUP01_present.Gongyoleg_Keszlet_in_B	1	SUP01_present.SKU002_ER_Gongyoleg2_to_SUP02_W	0
14	SUP01_present.SKU002_Keszlet_in_B	1	SUP01_present.SKU002_ER_Gongyoleg2_to_SUP02_W	5
15	SUP01_present.Gongyoleg_Keszlet_in_B	0	SUP01_present.ER_Gongyoleg1_Osszeallitas_W	0
16	SUP01_present.SKU001_Keszlet_in_B	0	SUP01_present.ER_Gongyoleg1_Osszeallitas_W	1
17	SUP01_present.SKU002_Keszlet_in_B	0	SUP01_present.ER_Gongyoleg1_Osszeallitas_W	2
18	SUP01_present.ER_Gongyoleg2_Bontas_U	5	SUP01_present.SKU004_Keszlet_out_B	0

Figure 1.7.30 List of DES objects and their connection in DES_GRAPHICAL_EDITOR

The illustrations above show the list of DES objects and the relationship list of DES objects obtained after running the Graphics Editor program. The DES model can be of arbitrary complexity, and the number of DES objects used is limited to the computer memory used.

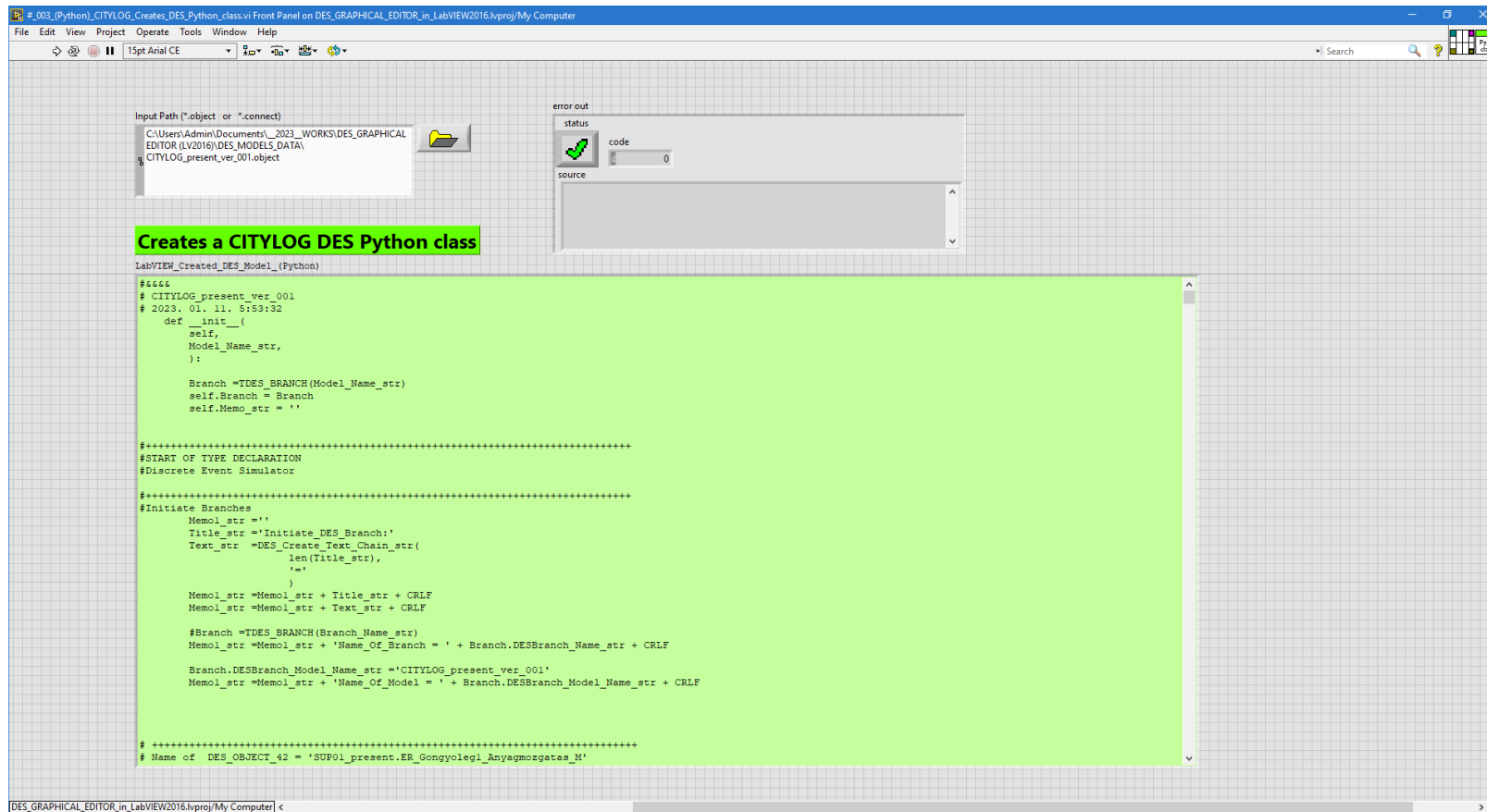


Figure 1.7.31 Python program in DES_GRAPHICAL_EDITOR based on the list of DES objects and their interconnection

Based on the list (and parameters) of DES objects and the connection list of DES objects, the Graphical Editor creates the Python source code of the DES model, which can be loaded directly into the DES Python simulation system and run the model.

2. Probability calculation

Basic concepts

Stochastic processes

2.1 Probability theory

The probability theory One of the branches of mathematics. Its original motivation was derived from random (in other words, indeterministic) mass phenomena, in short *experiments* examination of the company. These experiments can be repeated arbitrarily many times (this makes them mass phenomena), each repetition can have multiple outcomes, but we cannot predict exactly which outcome will occur at which repetition (which makes them indeterministic). An experiment is, for example, tossing a coin: theoretically, you can toss it any number of times, but usually you can't predict definitively which side it will fall on.

In the twentieth century, probability theory was put on a formal basis with the Kolmogorov axioms. With this, probability theory analysis is more abstract, set theoretical-Topological branches. Its main branches are classical probability theory, mathematical statistics, the theory of stochastic processes (process statistics), and information theory.

Among the founders of probability theory – the "mathematics of chance" – the French should be mentioned above all Pierre Fermat (1601–1665) and Blaise Pascal (1623–1662), although some works on this subject were published before their work. The most important example is De ludo aleae (*About the dice game*) book, which To Cardano (1501–1576), but about dice games Claudius, Roman emperor also wrote a longer, humorous treatise. This branch of mathematics is based on the Gambling theory, so most of his early works on the laws of chance had similar titles.

In their correspondence, both Pascal and Fermat discuss and solve problems and tasks related to dice and other games ("point sharing problem" and "de Meré knight's problem") respectively, and lay the foundations of "classical" or "combinatorial" probability theory.

The year of birth of probability theory as a mathematical theory is 1654, which is the date of one of Fermat and Pascal's letters on the subject. The "probability" itself (*probability*) word Jakob Bernoulli (1654–1705) *Ars conjectandi* (*The art of guessing*, 1713). If you perform the same experiment many times and record how many times an event occurred during that event, then as you perform the experiment more and more times, the relative frequency of that event (i.e., the number of events occurred divided by the number of attempts) will increasingly approach a number: the probability of the event. For example, if you roll a dice many times and have an equal chance of falling on all six sides, then after enough tosses you will find that you have got the number six in about 1/6th of the rolls.

The theory of gambling was later expanded to include insurance, population and stochastic (random) geometry problems (target shooting theory). The most important mathematicians who have dealt

with such problems (and their names can be found, for example, in the names of theorems): Moivre, Legendre, Bayesian (see. Bayes' theorem), Poisson, Gauss, Buffon (see Geometric probability). The Nineteenth century Probability theory has become a huge, independent branch of mathematics. Pierre-Simon de Laplace (1749–1827) published in 1812 *Théorie analytique des probabilités* (*Analytical theory of probabilities*) is not only a summary of this theory, but one of the engines of its development for a long time.

The 'modern-day' (19th century second 20th century first half) probability theory was carried forward by the "Russian school", among them the most well-known Chebyshev, Markov and Lyapunov. The axiomatic foundation of the theory was laid by the Russian Kolmogorov carried out by 1933 (see Kolmogorov axioms). This made probability theory a formal theory on an equal footing with other branches of modern mathematics. Kolmogorov coined the concept of a "probability field": it is the combination of a set of events (event space) and a "probability calculation method" (a non-negative real-number function). This concept is already a product of postmodern mathematics based on structure and model theory.

Probability theory not only established itself in the twentieth century, but was constantly expanded to include areas such as describing the wandering of a particle in multidimensional Euclidean space (see Brown-movement, Wiener process). In the second half of the twentieth century, two important new branches of probability theory were born as independent sciences as products of technical, engineering and statistical problems: Process statistics, or Information theory. But not only "came from outside", for example, physical enriched with problems of origin, like wanderings; but it has also found application among mathematicians of other disciplines; Thus, nowadays we can meet such "strange" ideas that number theory problems can also be examined on a probability basis. In the natural sciences (especially physics) it is used to quantify the "solidity" of statements, as is error calculation and other numerical methods theory

2.1.1 Event (mathematical)

The in probability theory that Ω Event space certain (measurable) subsets of $\mathcal{A} \subseteq \mathcal{P}(\Omega)$ Its nonempty set is called event algebra. That $\mathcal{A}$ event algebra for all $A \in \mathcal{A}$ elements event called.

For example, rolling the dice equals an even number $\{2, 4, 6\}$ of the set $\{1, 2, 3, 4, 5, 6\}$. An event occurs or occurs if it contains the result of a random experiment.

An event equal to the basic set of the event space is the sure event because it always occurs. In contrast, an empty set is an impossible event that never occurs. For example, when rolling dice, the sure event is $\{1, 2, 3, 4, 5, 6\}$ and the impossible event is $\{0 \text{ (non-existent number on the dice)}\}$

2.1.2 Event space

In probability theory, *event space* contains the possible outcomes of a random experiment. The events that contain them as single-element sets are called elementary events.

It is customary to call the outcomes themselves elementary events, leaving aside mathematical accuracy.

Usually, the event space is denoted by Ω . To describe random experiments, a probability space is required interpreted in the event space. This determines events and gives them probability. The result of a multiphase random experiment can be illustrated by a decision tree.

2.1.3 Probability variable

The *probability variable* One of the most important concepts in probability theory. In essence, it is suitable for the mathematical formulation and modeling of phenomena that (a) take on a value dependent on chance.

For example, the result of a roll of the dice, the level of water in a river, or the height of people on the street. Formally, a probability variable characterizes an outcome, not necessarily numerically. A nonnumerical random variable can be a direction of motion, a permutation, a graph, or any other mathematical object.

An outcome can be assigned various probability variables, called realization, or paths in stochastic processes.

Although the visual meaning of the probability variable is relatively easy to grasp, precise mathematical determination was delayed until the twentieth century and uses quite serious functional and measure theory tools.

2.1.4 Probability distribution

Related to the probability variable is the image space-induced probability distribution. The two concepts are also used interchangeably.

For example, if it is a normally distributed probability variable, it is thought of as a real-valued probability variable whose distribution corresponds to a normal distribution.

Probabilistic properties can be expressed only based on a common distribution of probability variables. It is not necessary to know the probability field on which the probability variables are defined.

They often use their distribution or density functions to give probability variables, leaving the probability field in the background. This perception is permissible in mathematics, if there really exists a probability field for a given distribution.

For several, but finitely many, probability variables, it is enough to specify the common distribution function, leaving the probability field in the background. Given a countable infinite army, it is enough to give common distribution functions of finite sets. The probability field itself is less questionable than whether there is a common probability field in a countable infinite case. Independent case of question by Émile Borel using the unit interval and the Lebesgue measure. One possible proof considers the binary digits of numbers written in the binary number system to be Bernoulli processes enclosed in each other (Hilbertsimilar).

The distribution is one of the most important functions of a probability variable, which tells you what value it is likely to take, how likely it is to fall into a given interval, for example, to roll no more than four dice.

For a continuous probability variable, the density function makes it easier to calculate the probability that the variable will fall within a given interval. Other typical values are expected value, standard deviation, and higher-order moments.

2.1.5 Classes of probability variables

The two most mentioned types of probability variables are discrete and continuous probability variable.

Graphically, a discrete probability variable is one that can only take separate values, and a continuous one that can take any value at least one interval.

Examples of discrete probability variables are those that describe the outcome of a roll of the dice, or how many of the 8 customers who walk into a store next are men.

On the other hand, a probability variable that describes how tall the next customer entering the same store is or how much a peach harvested from a tree weighs can be considered continuous, since these variables can take any value, at least over one interval. (This paragraph only illustrates the concept of continuous probability variables and is not entirely accurate. The precise mathematical determination can be found at the following Internet address.

https://hu.wikipedia.org/wiki/Val%C3%B3sz%C3%ADk%C5%B1s%C3%A9gi_v%C3%A1ltoz%C3%B3

The constant probability variable is discrete (degenerated): $X(\omega) = \text{constant}$ for all ω .

It is important to note that there are not only discrete and continuous probability variables, so these two classes do not give the partition of the class of probability variables.

For example, the probability variable that describes the following experiment is neither continuous nor discrete: toss a coin, if the result is head, then the value of the probability variable should be 2 if it is written, then the probability variable should take a number randomly on the interval $[0,1]$ (according to an even distribution).

It is worth distinguishing continuous and discrete probability variables from the large class of probability variables because these two classes behave very well—and very differently—in many ways. For example, discrete probability variables have a special and easily calculable formula for calculating the expected value, and its density function can only be a continuous probability variable.

2.1.6 Main probability distributions

- Bernoulli distribution
- Beta distribution
- Binomial distribution
- Borel distribution (Borel-Tanner distribution)
- Breit–Wigner distribution
- Cauchy distribution
- Dirichlet distribution
- Uniform distribution
- Erlang distribution
- Exponential distribution
- *F-distribution*
- Gamma distribution (Γ distribution)
- Gaussian distribution
- Geometric distribution
- Hyperexponential distribution
- Hypergeometric distribution
- Indicator distribution
- Characteristic distribution
- Chi-squared distribution (χ^2 -distribution)
- Logistic distribution
- Lognormal distribution (logarithmically normal distribution, logarithmic-normal distribution)
- Markov-Pólya-Eggenberger distribution
- Negative binomial distribution
- Normal distribution (normal distribution)
- Pareto distribution
- Pascal distribution
- Pearsonian distributions
- Poisson distribution
- Polyhypergeometric distribution
- Polynomial distribution
- Weibull distribution (Weibull-Gnedenko distribution)

2.1.7 Conditional probability

That *The Event* the B event-related conditional probability gives the probability of an event occurring, provided that B event has already occurred or is occurring. Marking $P(A | B)$, orally: A provided B .

2.1.8 Stochastic process

The stochastic process, also known as random process, the process by which all or part of it is carried out Probability variables characteristic. The opposite of this is the deterministic process, where variables that describe the process do not change randomly.

A stochastic process is a process that occurs over time. The process can take place in discrete time, where the probability variables correspond to a time series, or it can be a continuous-time process, where probability variables that characterize the process partially or completely can change continuously over a given time range. The only requirement is that the probability variables must be of a similar type.

Notable stochastic processes:

- Random movement (wandering)
- Brownian motion
- Markov chain
- Poisson process
- Gaussian process
- Transport models
- Genetic models
- Fatigue models
- Stock market developments
- Exchange rate changes
- Change in blood pressure
- Change in wind wave direction and speed.
- Weather change

2.1.9 The Markov chain

The mathematics the Markov chain a so discret stochastic process which has the property of Markov. Named after a Russian mathematician, about Andrei Markov (1856–1922).

In short, to be a Markov property means that, given the present state, the future state of the system does not depend on the past state. In other words, this means that the description of the present fully encompasses all information that could influence the future state of the process.

For example, consider a physical system whose possible states are $A_0, A_1, \dots, A_k, \dots$. The S system changes its states randomly over time; We study the state of the system using $t = t_0, t_1, \dots, t_n \dots$ at discrete times, and let x_n be equal to k if S is in the state A_k at time n .

Using this terminology, the Markov property can be formulated as follows: Previous states of the system can influence later states only through the present state.

Given the present, therefore, the future *is conditionally independent* of the past. Nothing that happened in the past has an effect, does not give a forecast for the future, everything is possible in the future. A basic example of this is coin tossing – if you throw a head the first time, you can throw a 50/50% on the second one, you can throw both a writing and a head. And if you throw your head 100 times in a row, you are just as likely to get a head to 101st as you are to write a head, so the past is not a predictor of future results. The present state is that we have a coin (not zined) with heads and writing on either side. Assuming a regular framework, nothing else can influence the future throw.

At each moment, based on the distribution *of that probability variable*, the system either changes its state from its present state or remains the same. State changes are called transitions, and probabilities that apply to different state changes are called transition probabilities.

Using a Markov chain, we can describe the possible states of a system and the probability of transitions between them. It can be represented on a diagram (flowchart, directed graph): states are vertices of the graph, transitions are represented by arrows on which the probability of a given transition is written.

The Markov chain can also be encoded in the transition matrix M : M is a square matrix with as many rows and columns as there are states of the system. $m_{i,j}$, that is, the j -th element of the i -th row gives how likely it is to pass from the i -th state to the j -th.

All elements of the transition matrix M are non-negative, and the sum of the rows is 1.

These series are therefore probability distributions. Such matrices always have an eigenvalue of 1!

The current state of the system, which is also a probability distribution, can be encoded in a vector v . It is customary to write v in row vector form. The following states of the system are defined as $v \cdot M$, $v \cdot M_2$, $v \cdot M_3$, ... vectors.

Since the eigenvector (left) is 1, i.e., such a (row) vector w that $w \cdot M = w$. So w describes a state of the system that does not change later. This is called a stable or stationary state. If all elements of M are positive, i.e., there is a transition between any two states, then the stable state w also describes the long-term behavior of the system: starting from any state v , we get closer and closer to the state w over time, i.e., $v \cdot M^n \approx w$ if n is large enough.

2.1.10 Petri net

The Petri Net Mathematical representation of discrete distributed systems. Petri nets are defined by 1960s Carl Adam Petri was defined first. Because this representation can represent events taking place at the same time, Automata theory generalization.

A Petri net consists of places, transitions, and directional edges as elements. The edges connect the places to the transitions and vice versa, but there is no direct edge relationship between the places and their own group of transitions, i.e., Petri nets are directed even graphs. Any number of "tokens" in each location" tokens are transferred to the next location (i.e., the location-related transition "fires") if the "firing" condition is met on each of the edges leading to the transition.

Today, Petri networks are classified as mathematical modeling languages, which can be used primarily to describe distributed and parallel systems. It provides graphical and mathematical descriptions at the same time, allowing you to quickly review complex systems and immerse yourself in their details. In today's modern computer science and science, workflow-driven modeling plays a key role (workflow management). Petri networks are perhaps even more important for so-called non-deterministic systems. Such systems are characterized by the fact that one state does not clearly imply their next state.

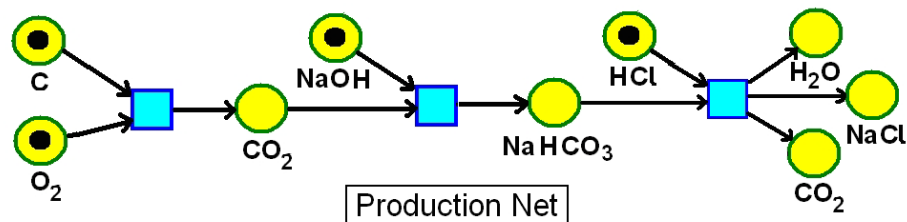


Figure 2.1.10.32 Description of chemical processes using Petri nets

The Petri network (Petri net, Place/Transition net) is essentially a directed and weighted even graph with two types of nodes, position, and transition (**Figure 2.1.10.32**).

Weighted directional edges can only be between positions and transitions, or between transitions and positions. Positions from which a directed edge goes in the direction of a transition are called input locations, and where a directed edge goes from transition to position is called output.

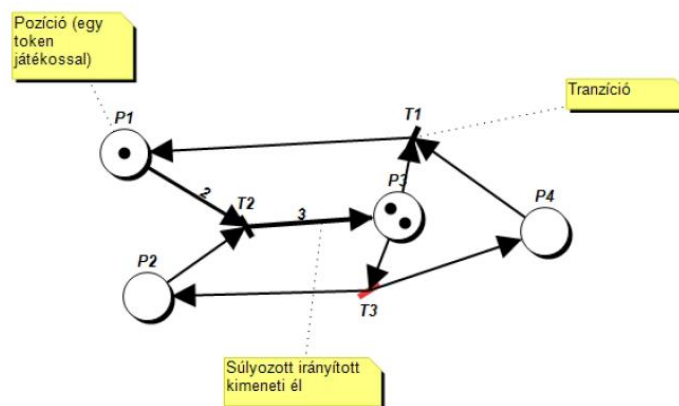


Figure 2.1.10.33 Sample of the structure of a Petri net

2.1.10.1 Extensions

There are several extensions to the Petri net, which attempt to improve the negative and sometimes limiting properties of Petri nets (time-independent, non-deterministic operation, infinite circles, opaquely large networks). Some of them are backwards compatible (some people do not consider them extensions), i.e., they can be clearly converted back to generic Petri nets (e.g., tinted Petr), and some merely add additional features to the network that could not be described before (e.g., timed Petri nets). Some extensions can be combined with each other. More complex extensions are sometimes called High-level Petri nets.

2.1.10.2 Reset Edge Introduction (Reset face)

The reset edge is not a condition for firing, but empties the position when firing the transition, i.e., there can be no token there after firing. Its orientation can only be from position to transition, it has no weighting.

2.1.10.3 Capacity limit

You can set a capacity limit for part of the position of Petri nets. This determines the maximum number of tokens that can be included in a position. Thus, if the capacity limit is exceeded by the number of tokens after firing a transient at a given location, firing cannot occur.

2.1.10.4 Prohibitive Edge Introduction (Inhibitor Face)

Instead of the capacity limit, you can use kill edges. The prohibitive edge between position and transition indicates that if a token is on the position, the transition cannot fire. The block edge can also be weighted, which indicates the number of tokens on the position that triggers the ban (if the position has tokens equal to or more than the weight, the block is active, otherwise this does not mean a constraint). The kill edge, like the reset edge, can only point from position to transition.

2.1.10.5 Prioritised Petri Nets

Each transition can be assigned a priority. The process of token play thus changes in that a transition can only fire if it does not have a transition ready to fire with a higher priority. Transitions can have the same priority, so priority groups exist. If a state arises where transitions in the same priority group are ready to fire only, then the operation remains non-deterministic.

2.1.10.6 Coloured Petri nets (CPN = Coloured Petri Nets)

The High-level Petri nets group includes tinted Petri nets. In the original Petri net, tokens are indistinguishable, whereas in CPNs, each token has a value, which is often typed, which allows operations to be performed in the model. In support of the latter, edge expressions and guard expressions appear.

The latter can be linked to a given input edge and define the conditions under which the attached transition can fire if true, while edge expressions determine how many and what type of token players appear at the output locations after firing (the parameters of edge expressions are tokens of the input locations). It is said that Tinted Petri nets are also programming languages. It is mainly used where synchronization, communication and resource sharing are important. The presentation of this extension is often compared to the relationship between assembly code and high-level programming languages [12]. In theory, both levels have the same expressive power, but in practice, high-level languages (and thus Tinted Petri Nets) have much greater modeling power.

Token types, edge expressions, and guard conditions can be specified in Standard ML, a highly typed functional programming language developed by Robin Milner [14].

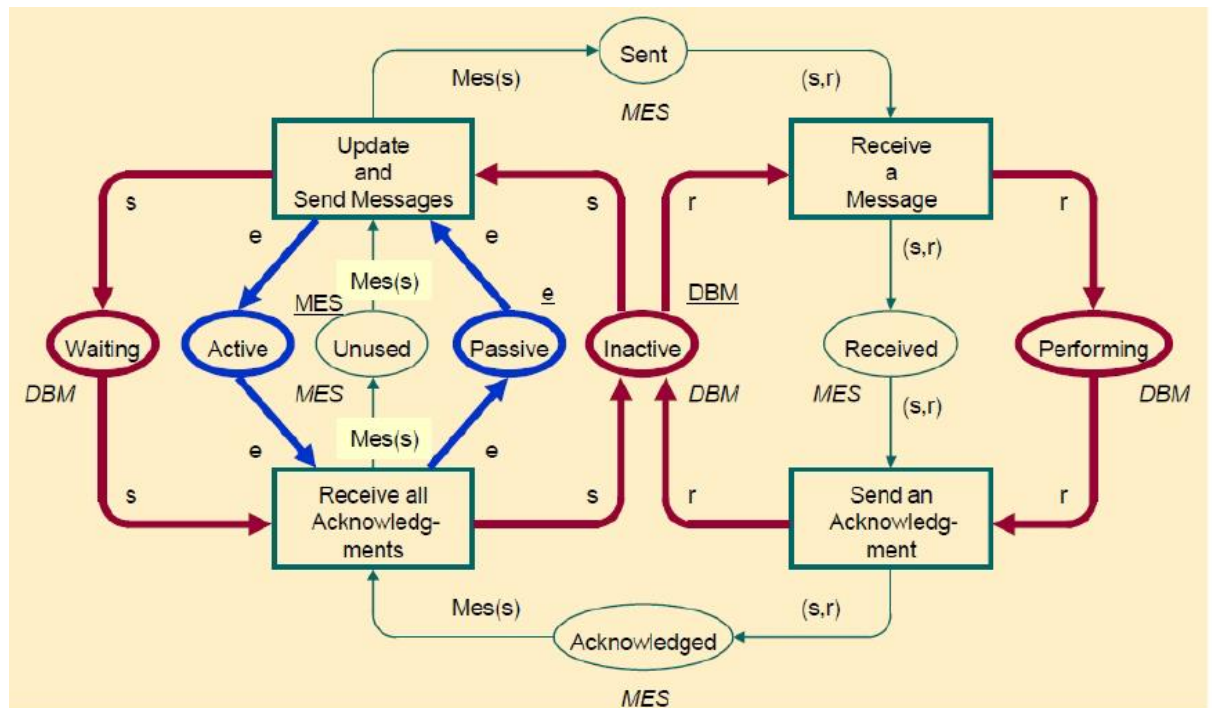


Figure 2.1.10.34 CPN model of a distributed database management system

Each Tinted Petri net may be converted/folded back into the original Petri net as shown in **Figure 2.1.10.33** and **Figure 2.1.10.34**.

One of the largest university research projects on Coloured Petri Nets is being conducted at Aarhus University [11] in Denmark under the leadership of Kurt Jensen.

2.1.10.7 Timed Petri Nets

The basic concept of timed Petri Nets is that it is not enough to define the structure of the model, but also the timing, because according to the rules of the token's game, a transition ready to fire takes place immediately after a non-deterministic decision, in an atomic step, to use a term "alien to time". In connection with the original Petri nets, we can only talk about logical time, in which we can determine in each token game which transition fired earlier in time relative to another. However, physical time (which is usually regularly periodic) cannot be assigned to this sequence of operations. In timed Petri nets, there are transitions that can fire only in an external time (e.g., clock speed), and there may be transitions that are not traditionally timed. Typically, for example, we can make the operation of our network time-dependent by timing a source transition. With the introduction of timing, the token game becomes "playable" rather than just stoppable, so another new feature of transitions appears, namely latency. Thus, in "playback" mode, transitions that are not tied to timing fire immediately, but only after the set wait. [1]

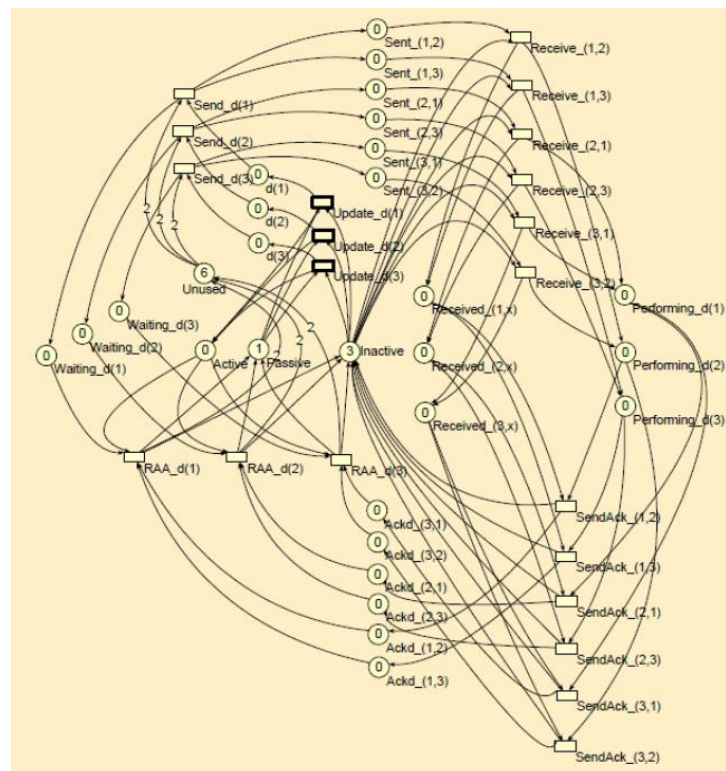


Figure 2.1.10.35 PN model of a distributed database management system

[1] 20120428-petrinets-oo-env-bedokdavid-thesis-v044.pdf

2.2 Finite state automaton

The *finite state automaton* (Finite State Machine) is a system engineering concept used by programmers, mathematicians, engineers, and other experts to describe a mathematical model of an arbitrary system that has a finite number of (conditional) states. A practical example of a finite state machine is, for example, a set of buttons that are control buttons in a video game and are associated with a specific set of actions in the game. When a user presses a button, the system performs the action associated with the button.

The preparatory operations for automating the design of a finite state are as follows:

- Establish (set) of possible input events.
- Define output states for possible input events.
- Establish possible states of the system.

The finite state is an automaton that can be implemented with a program or in the form of a circuit. Within a finite state automaton, for all states, there is a finite list and an abstract machine that can take only one of these states at a given moment in time. This system approach allows each input and output state sequence (state scenario) to be studied and tested.

A finite state automaton can be a very complicated, abstract process, such as an economic model that is illustrated by illustrations, or something more tangible, such as a vending machine or a computer. The set of possible states is a limited value for these finite state automata. Another alternative is that the finite state can be fuzzified automatically. The fuzzy type of finite state automaton allows data points not to be specific, pre-designed definite states. You can read more about fusion at the following Internet address:

https://hu.wikipedia.org/wiki/Elmos%C3%B3dott_halmazok_logik%C3%A1ja

2.2.1 Automatic theory

That *automatic* word, usually means a physical apparatus, but in this definition, it is an abstraction with which one can describe anything from a set of input events to computers, a simple analog machine, or a model of an abstract concept of automata theory. That *Automatic theory* It is one of the theoretical branches of computer sciences and discrete mathematics, focusing on the logic of simple machines.

Computational models in automata theory include:

Automatic type	Description
Finite State Machine	A model of any system with a limited number of conditional states.
Push button automatic (pushdown automatic)	Much more complicated than the finite state automaton, stack memory is used as part of the model to store information.
Linear delimited automaton (Linear Bounded Automata)	It is similar to a Turing machine, but the data is assigned to a group of inputs and there are a finite number of groups of inputs.
Turing Machine (Turing Machine)	The most complex mathematical model in automata theory, used to study different input combinations to analyze a larger system or problem.

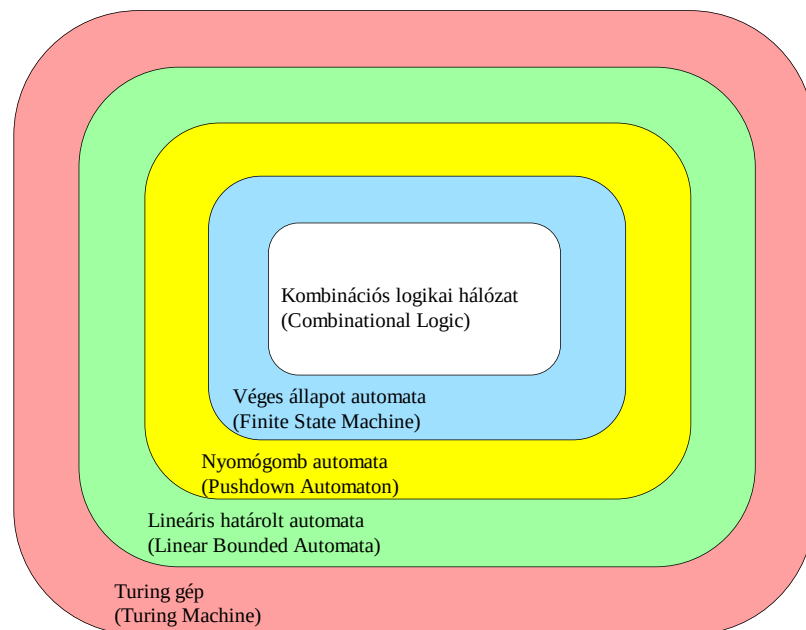


Figure 2.2.1.36 Automatic types

2.2.2 State transition

When a finite state automaton switches from one state to another, it *state transition* called. When assessing the operational quality of a system, it usually includes *All statuses* and *Examine transitions of all states*, considering all (optional) *possible input state*. In many cases, finite state automata are implemented using a programming language in which state transitions are functions written in that programming language. In addition, artificial intelligence can be used in collecting data read from the system, pattern recognition and automated model generation.

For simple problems, information can be displayed in tables, matrices, diagrams, and signal stream graphs, but finite state automata provide researchers with the opportunity to realize much more complex operating states.

The diagrams of finite state automata show the logical relationship between input and output combinations that characterizes the finite automaton under consideration.

2.2.3 Finite state automaton: better than process graph (state diagram)

Learn the basics of process planning and apply them to automate company documentation and *organize workflows*.

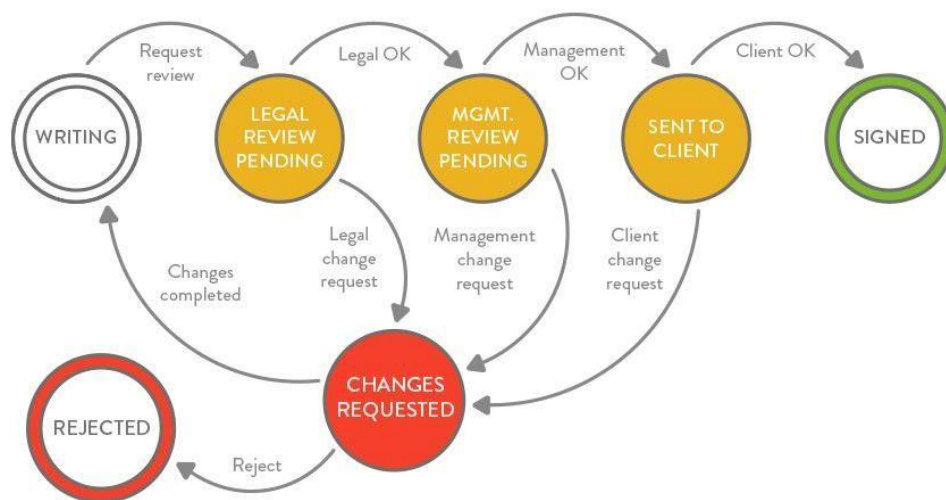


Figure 2.2.3.37 Process graph of an enterprise workflow

The *process graph* (state diagram) can be flexibly applied to map systems and describe a wide range of system processes.

The *pipeline graph* (*status diagram*) as a logical design tool dates to the 1920s, when Frank and Lillian Gilbreth presented to members of the American Society of Mechanical Engineers (ASME).

The system description quickly found support in engineering circles, and by the 1930s it was widely used by economists to simplify their work. In the 1940s, it was used as a basic tool in process design

by American companies such as Procter and Gamble. Others have used the description technique to map information processes in multilevel documentation and modeling their relationships.

2.2.4 Process graph (state diagram) in business and programming

In 1947, ASME adopted a logical process graph (state diagram) symbol package and Herman Goldstine mathematician, as well as John von Neumann He developed programming process graphs to design coding problems with an electronic computing device. The process graph (state diagram) was a basic design tool for computer programmers when describing algorithms until the 1970s, when it lost popularity due to technological changes.

The process graph (state diagram) is very far from being retired forever. It is still widely used today in developments to make the real course of processes understandable at a high level. Of course, this is not like in programs, for many of us it is probably difficult to sketch a complicated process graph (state diagram) to illustrate to ourselves or others how a business process runs.

From this perspective, the process graph (state diagram) usually models how to solve the course of a given process. The disadvantage is that the process graph (state diagram) focuses on the user's solution rather than the business process itself. As a result, when user actions become complex or processes require human-to-human collaboration, the business process becomes increasingly difficult to discover in the process graph. Just as when an outline becomes more complex and focuses on multiple goals, it will depict the process less and less.

Finally, business process graphs are very useful in training new employees and presenting solutions, but they are not as successful in analyzing or modeling business processes.

2.2.5 Efficiency of conditions, finite state

Finite state automatic diagrams were first developed by neurophysiologists (Warren McCulloch and Walter Pitts), biologists, mathematicians, engineers, and the first computer scientists (G. H. Mealy and E.F. Moore) was applied. They all shared the goal of trying to model the human thought process in the brain and its replica in a computer.

It was called the "automaton theory", which was first presented in 1943 and developed further in the fifties.

Put simply, instead of focusing on the solution, we describe two basic sets of questions when defining a finite state automaton.

How many different states does an automaton (or process) have during its entire lifecycle?

How (depending on what conditions) does the automaton switch from one specified state to another?

If we compare process graphs, which typically use nine (9) ISO/ANSI logical symbols, the finite state automaton (FSA) accomplishes this with two symbols. The circles represent states, and the arrows represent state transitions.

The circle represents the state in which the vending machine is currently located. The arrow, which goes from state A to state B, describes an operation that changes the state of the automaton to state B, assuming that its current state is A.

States are usually described as status ('hungry', 'sated'), while arrows are described as state transition ('eat') or event ('5 hours passed').



Figure 2.2.5.38 Finite State Automatic Diagram: Daily Feeding

The initial state from which the automaton starts does not have an input state transition (it has no inputs). The final state (of which there may be several) has no output state transition (no outputs) and represents the end of the process or automaton's life cycle.

Both initial and end states have double-framed circles in the FSM diagram, while actual states are represented by single (boundary) circles.

If we apply the system description method based on the operation of finite state automata, business processes that contain a significant number of possible solutions or operational relationships between different groups of people can be better modeled, analyzed and presented.

These are the advantages why workflows defined as finite state automatons (FSAs) focus on procedures and investigation. Define how a specific goal could be achieved with a specified organizational structure, and how many different states of information exist while performing the procedure. As a result, the procedure described by the finite state automaton (FSA) technique is independent of the role of individuals.

Let's use the finite state automaton (FSA) diagram to describe a simple sales process. It only means defining states and processes (conditions) (in time).

The statuses are as follows:

- 'Being written'
- 'Management review'
- 'Sent to client'
- Accepted.'
- Rejected.'

State transitions define activities that change the state of the document.

The activities are as follows:

- 'Send to Manager'
- Changes needed'
- 'Send to requestor'
- Requestor accepts'.
- 'Requestor rejects' (*rejected by the customer*)



Figure 2.2.5.39 Simple Sales Process Finite State Automatic (FSA) Diagram

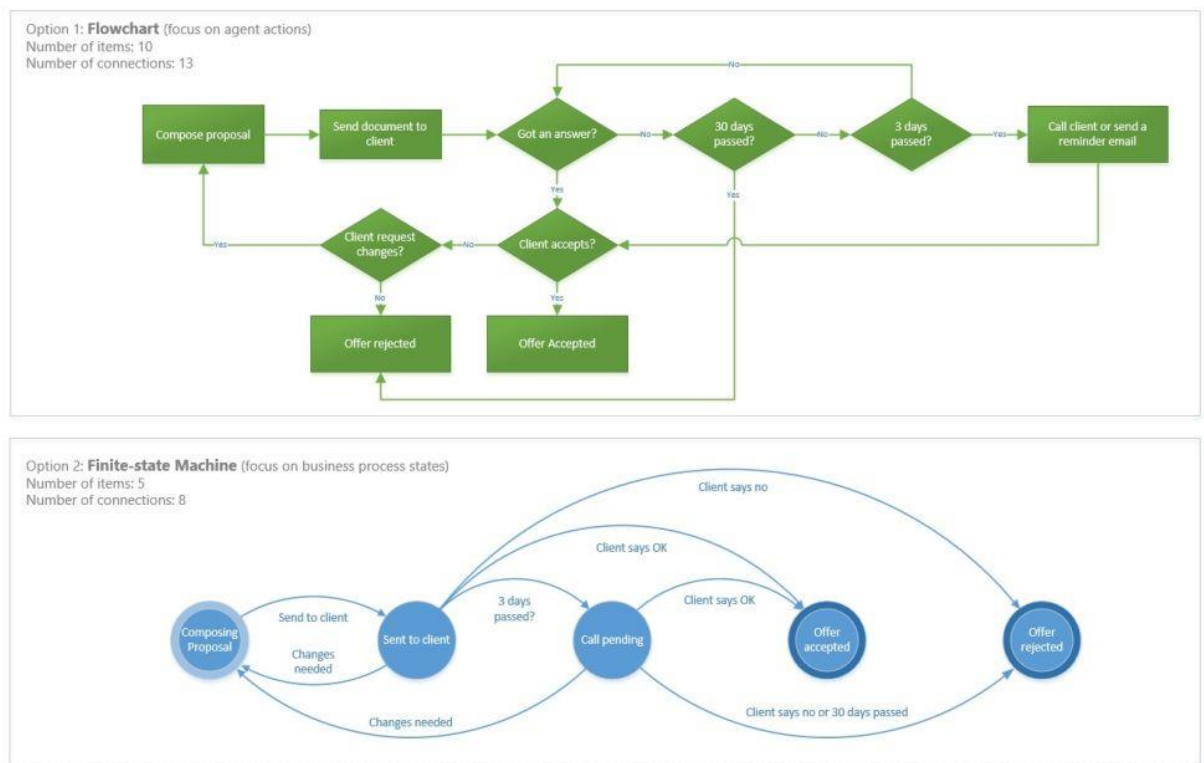
Once a process has been described using a finite state autograph (FSA), users can easily perform (state) transitions from one state to another.

The (working) process created on the finite state automaton (FSA) principle also simplifies business procedures when compared to describing the same system process with a graph (state diagram).

The system described by the finite state automaton (FSA) is preferable in that it contains fewer information states than transitions implementing solutions.

The following diagram shows the implementation of a more complex sales process using a process graph (state diagram) and a finite state automaton (FSA) so that they can be compared.

Flowchart vs Finite-state Machine sample: Sales Proposal Workflow

**Figure 2.2.5.40** A graph (state diagram) and a finite state automaton (FSA) graph of a more complex sales process to compare.

2.2.6 Basic aspects of finite state automata design

If we apply the theory of finite state automata (FSA) to describe the process of managing documents in an organization, then whether they come from outside or are created internally, their management becomes simple.

Many document types and procedures can be created in individual parts of the company. However, it should be borne in mind that not all documents will reach all states, and not all possible actions will be performed on all of them. For example, it is unlikely that documents will be prepared by those engaged in sales, instead it is done by people who perform this operation routinely and are constant participants in the workflow.

Consequently, the procedure for managing the document, as well as the workflow, can be divided (segmented) into individual important parts of the business process. This eliminates document organization that leads to unnecessary complexity, as well as overlapping of authority between individual units (departments) of the company.

Such a separation process based on the documents entering which business unit is responsible for managing it, such as *sales, labor management or finance*, and so on. Another sorting criterion can be sorting by type of document, here we can distinguish between *agreement, sales proposal or random event* and many other types of documents.

When planning the implementation of processes in the organization of corporate documents, it is fundamental to define all the states into which the document can fall, as well as to specify precisely the actions that will allow the document to pass from one state to another.

Each business unit's workflow can be designed to handle different types of documents. In the corporate sales department, it is probably necessary to store and manage the quotations that are sent to the various requests for quotations. A series of individual workflows deals with the process of managing this type of document in the company.

This is likely to be the life-sustaining element of these sales to ensure the repeatedly high-quality quotes they get to win new orders.

2.2.7 Program and automation of the administrative procedure

When designing workflows and implementing automated document management using a program, this is probably a finite state automaton (FSA)-based program that, with its well-thought-out management, provides a truly simple use.

For example, such a document management program is expected to make drag and drop simple for the user. This does not require any programming experience or dealer approach, or an added value that increases installation time and costs.

With such a fast system, planning and configuration is also easy and allows you to trace, refine and optimize the process for every conceivable task in just a few minutes.

On the other hand, if a procedure is defined using a finite state automaton (FSA) diagram, the activities with state transitions are usually also simple and repeatable. Consequently, it will be perfect if we use a target program for automation.

If a quote proposal is in the '*requested*' state and you have a sample quotation document (template) after entering the basic data: customer name, address, request description and price, the program should automatically generate the quotation document (using the sample) and send it to the

customer for which the email address is applied. When you perform the 'send to client' status transition, the document status changes to 'sent to client'.

By automating all possible repetitive procedures, the office process automation program saves a lot of time.

Other automation options can implement conditions-dependent auto-execution for any state transition. For example, when the flow has spent a specified number of days in a specified state, or when a specified condition is met. In such cases, the user does not have to deal with the implementation of these tasks, he only needs to personally intervene in the operation of the program if the program requires it in special cases.

2.2.8 Principle of record management and automatic final states of finite states

When you create a finite state automaton (FSA) diagram for a business process, you mark the end states for each procedure. This is exactly the description of the task of how to handle the completed (completed, completed) documents (*record keeping policy*) at the company.

Document management programs usually allow you to automatically delete documents that have reached their final state within a specified day, monthly, or annually. This is a very useful feature of the program, so we must keep, archive, and later delete certain documents, following strict rules or real needs.

2.2.9 Versions, redesigns, and other tools

The program of document organization workflows, which implements multiple cycles of repetition and examination of documents before being sent to the customer, is designed to be very simple to use.

Consider a customer service department that must handle services from the first application of the customer to the resolution of the complaint. The customer application lifecycle can be easily presented on the finite status automatic (FSA) chart and can be managed and automated using the program.

The layering of various tools, such as metadata search, a PDF search machine, or digital signature, as well as automated email sending capabilities are the strengths of the program, helping to manage corporate documents in important steps and ensuring crash-free workflow execution.

By using the system stored in the cloud, we get another opportunity to store company documents, share backup files and change the status of documents today with a simple mouse click on a mobile device.

We looked at options in document management and lifecycle to determine workflows that meet a company's needs today.

Jorge Ramirez, founder and CEO, R2 Docuo. Image Credit: R2 Docuo

2.3 Random number generator types

To solve various timing tasks in the simulation model, several types of random number generators must be enabled in the DES Python system.

Random number generators are based on a random number generator evenly distributed between 0 and 1 available in Python. This random number generator is the basis for the **Constant, Uniform, Exponential, Normal, Triangle, and Empirically distributed** random number generator types. When called random number generators, they produce a parametric random number corresponding to the given type of distribution.

Although, as we showed in a previous chapter, there are many distribution functions in the literature and they are all feasible, but the most used types are the random number generator types listed.

If required, any random number distribution generator type can be inserted into previous random number generators.

Markings:

Density (Density) function =

$$f(x) > 0, \quad \text{for every } x \quad (2.3.1)$$

Distribution (Distribution) function =

$$F(x) = \int_{-\text{Inf}}^{+\text{Inf}} f(x) \cdot dx = 1 \quad (2.3.2)$$

Average (Mean)

$$\mu = \quad (2.3.3)$$

Standard deviation (Variance)

$$\delta = \quad (2.3.4)$$

The probability that x is between A and B is:

$$Pr(A \leq x \leq B) = \int_A^B f(x) \cdot dx \quad (2.3.5)$$

where:

$Pr()$ probability function
 $f(x)$ density function
 A, B x values

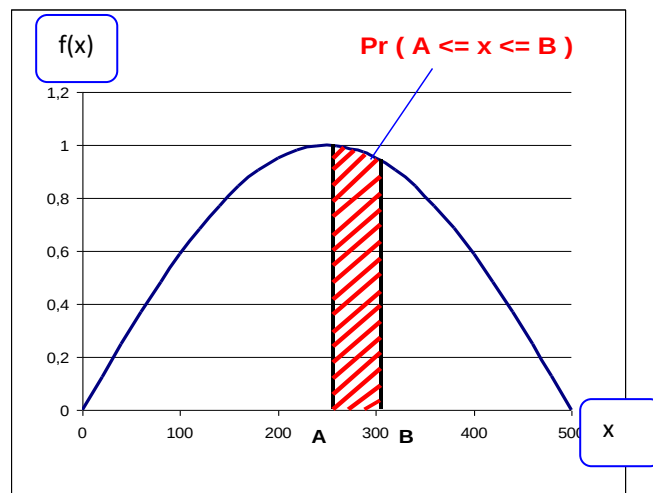


Figure 2.3.41 The probability of falling between a diagram of the probability density function and two points.

Determination of a density function from the distribution function:

$$f(x) = \frac{dF(x)}{dx} \quad (2.3.6)$$

where:

x Current value
 $f(x)$ density function
 $F(x)$ Distribution function

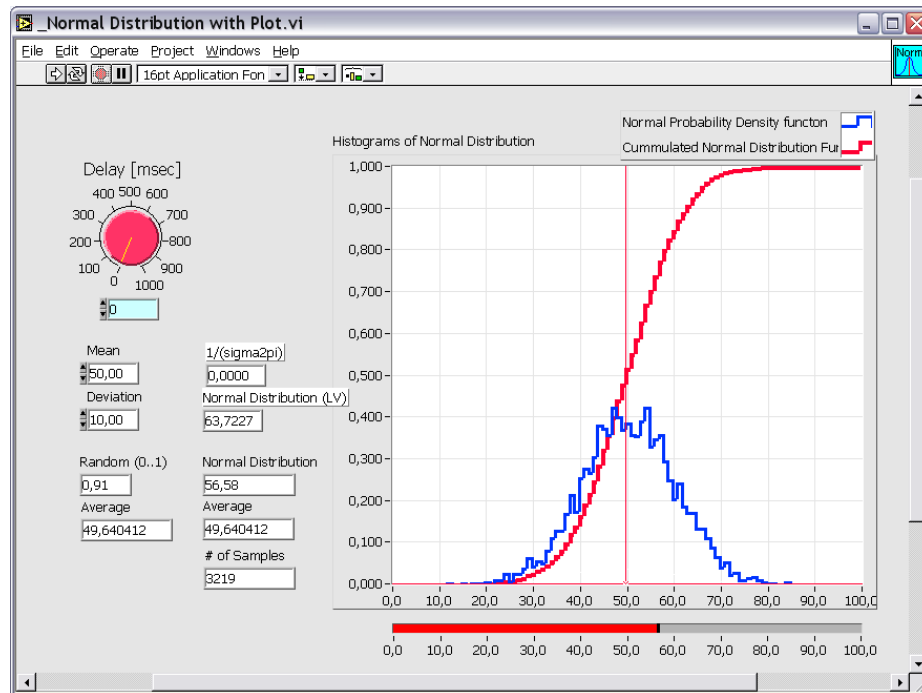


Figure 2.3.42 The density function (blue) and its cumulative function (red)

Determination of the distribution function using the density function:

$$F(x) = \int_{-\text{Inf}}^x f(\eta) \cdot d\eta \quad (2.3.7)$$

where:

x	Current value
f(x)	density function
F(x)	Distribution function

2.3.1 The most common continuously distributed probability density functions

1. Uniform Distribution
2. Normal Distribution
3. Triangle Distribution
4. Exponential Distribution
5. Erlang Distribution
6. Empirical Distribution

2.3.2 Uniformly distributed probability density function (Uniform Distribution)

At the uniform distribution The probability of occurrence of all values between the specified minimum and maximum values is the same. Such a type of probability variable (with discrete values) is the dice rolled value, where the probability of each side occurring is 1/6th of the same value.

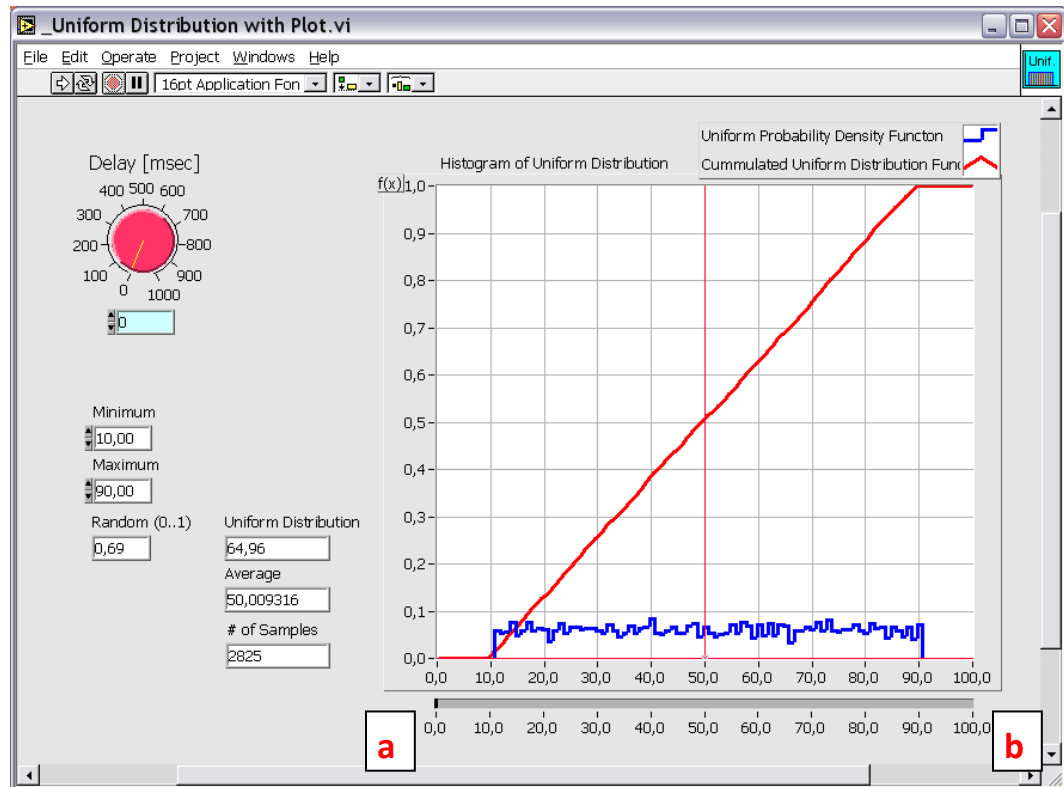


Figure 2.3.2.43 The probability density function of uniform distribution (blue) and its cumulative function (red) for a real series

The definition functions for uniform distribution are:

$$\text{Uniform Density} = f(x) = \begin{cases} \frac{1}{b-a} & a < x < b \\ 0 & \text{egyébként} \end{cases} \quad (2.3.8)$$

$$\text{Uniform Distribution} = F(x) = \begin{cases} 0 & x < a \\ \frac{x-a}{b-a} & a \leq x \leq b \\ 1 & x > b \end{cases} \quad (2.3.9)$$

$$\text{Uniform Mean} \quad \mu = \frac{a+b}{2} \quad (2.3.10)$$

$$\text{Uniform Variance} \quad \delta = \frac{(b-a)^2}{12} \quad (2.3.11)$$

2.3.3 Normally distributed probability density function (Normal Distribution)

The normal distribution It plays a decisive role in probability theory. Many probability variables occurring in practice are normally distributed or approximated by normal distributions. If the outcome of an experiment is influenced by many circumstances that are not dependent or act independently, so that the effects of the individual factors are cumulative, then a normally distributed probability variable is obtained.

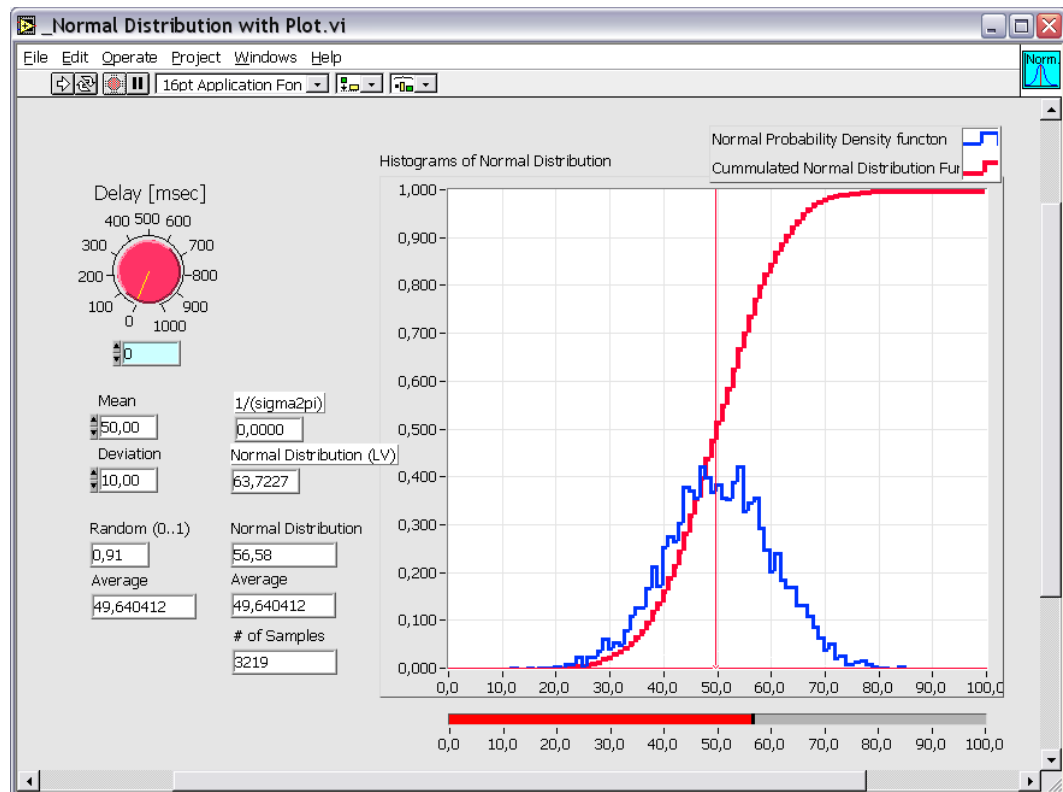


Figure 2.3.3.44 The probability density function of the normal distribution (blue) and its distribution function (red) for a real series

The definition functions of the normal distribution are:

Normal Density =
$$f(x) = \frac{1}{\sqrt{2\pi} \cdot \delta^2} \cdot e^{-\frac{(x-\mu)^2}{2\delta^2}} \quad (2.3.12)$$

Distribution = IT DOES NOT EXIST IN CLOSED FORM!

Normal Mean
$$\mu \quad (2.3.13)$$

Standard deviation (Normal Variance)
$$\delta^2 \quad (2.3.14)$$

2.3.4 Triangular distributed probability density function (Triangle Distribution)

The triangular distributed probability variable, an approximation of one.

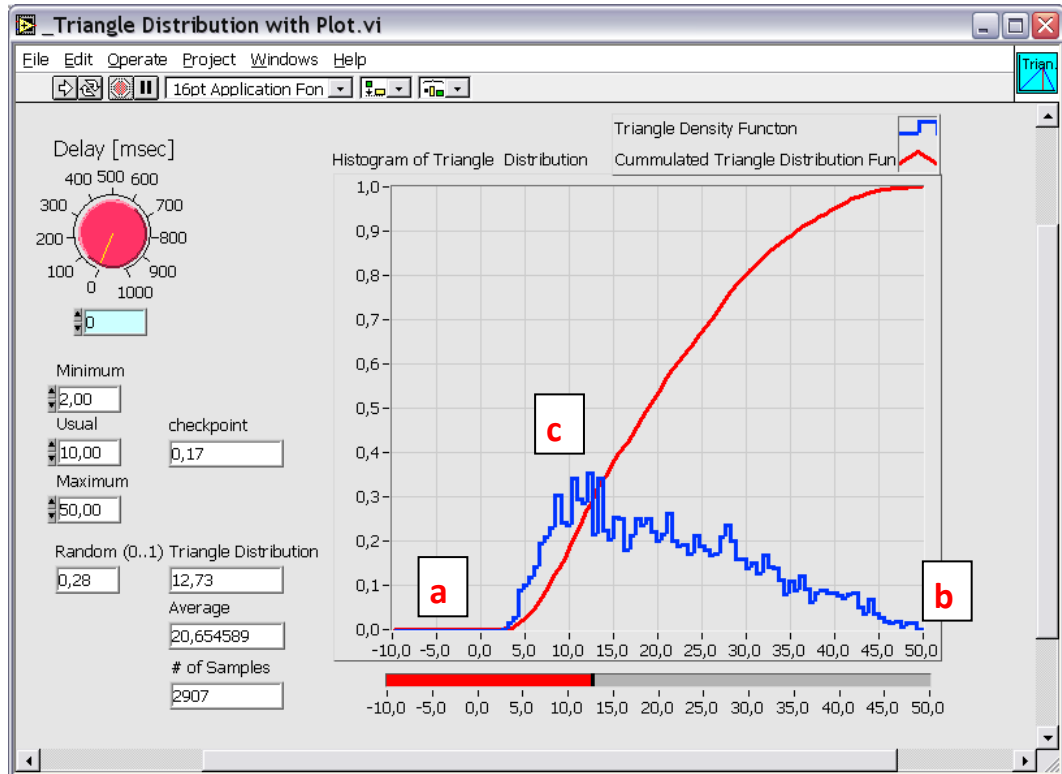


Figure 2.3.4.45 The probability density function of the triangular distribution (blue) and distribution function (red) for a real series of data

Definition functions of the triangular distribution:

$$\text{Triangle Density} = f(x) = \begin{cases} \frac{2(x-a)}{(b-a)(c-a)} & a \leq x \leq c \\ \frac{2(b-x)}{(b-a)(b-c)} & c \leq x \leq b \\ 0 & \text{egyébként} \end{cases} \quad (2.3.15)$$

$$\text{Triangle Distribution} = F(x) = \begin{cases} 0 & x < a \\ \frac{(x-a)^2}{(b-a)(c-a)} & a \leq x \leq b \\ 1 - \frac{(b-x)^2}{(b-a)(b-c)} & c \leq x \leq b \\ 1 & x > b \end{cases} \quad (2.3.16)$$

$$\text{Triangle Mean} \quad \mu = \frac{a+b+c}{3} \quad (2.3.17)$$

$$\text{Triangle Variance} \quad \delta = \frac{a^2 + b^2 + c^2 - (a \cdot b + a \cdot c + b \cdot c)}{18} \quad (2.3.18)$$

where:

Minimum value (Minimum)	= a
Usual Value	= c
Maximum value (Maximum)	= b

2.3.5 Exponentially distributed probability density function (Exponential Distribution)

Exponentially distributed can be considered certain time periods. For example, time elapsed until random failure of machines; waiting period; time elapsed until radioactive atoms decay. The sum of independent probability variables with exponential distribution Γ is Γ -distributed. More precisely, if $X_1, X_2, \dots, X_n$ are independent probability variables with an exponential distribution of parameters λ , then $X_1 + X_2 + \dots + X_n$ is a probability variable of order n with parameter $\lambda\Gamma$.

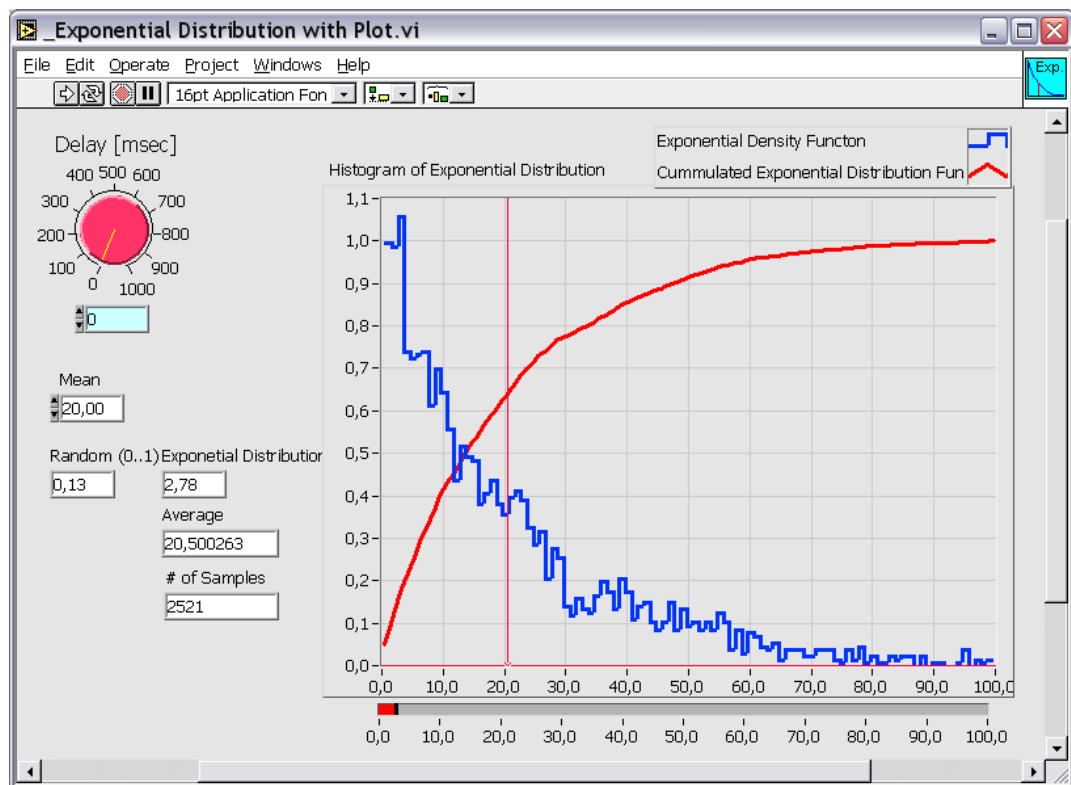


Figure 2.3.5.46 The exponential distribution is a probability density function (blue) and distribution function (red) for a real series of data.

Definition functions of exponential distribution:

$$\text{Exponential Density} = f(x) = \begin{cases} \frac{1}{\beta} \cdot e^{-\left(\frac{x}{\beta}\right)} & x \geq 0 \\ 0 & \text{egyébként} \end{cases} \quad (2.3.19)$$

$$\text{Exponential Distribution} = F(x) = \begin{cases} 1 - e^{-\left(\frac{x}{\beta}\right)} & x \geq 0 \\ 0 & \text{egyébként} \end{cases} \quad (2.3.20)$$

$$\text{Exponential mean} \quad \mu = \beta \quad (2.3.21)$$

$$\text{Standard deviation (exponential variance)} \quad \delta = \beta^2 \quad (2.3.22)$$

2.3.6 Erlang distributed probability density function (Erlang Distribution)

The Erlang distribution is a distribution function using a mixed strategy.

If $K=1$, then the distribution resembles exactly the function of the negative exponential distribution.

If K holds to infinity, then the distribution approaches the shape of the normal distribution.

Definition functions of the Erlang distribution:

$$\text{Erlang Density} = f(x) = \begin{cases} \frac{a^k}{(k-1)!} \cdot x^{k-1} \cdot e^{-a \cdot x} & \text{ha } 0 \leq x \\ 0 & \text{egyébként} \end{cases} \quad (2.3.23)$$

$$\text{Erlang Distribution} = F(x) = \begin{cases} 1 - (e^{-a \cdot x} \cdot \sum_{j=0}^{k-1} \left[\frac{(a \cdot x)^j}{j!} \right]) & \text{ha } 0 \leq x \\ 0 & \text{egyébként} \end{cases} \quad (2.3.24)$$

$$\text{Average (Erlang Mean)} = \mu = \frac{k}{a} \quad (2.3.25)$$

$$\text{Standard deviation (Erlang Variance)} = \sigma_x = \frac{\sqrt{k}}{a} \quad (2.3.26)$$

where:

k is the positive integer value taken up by the user, which is the cumulative distribution function shape.

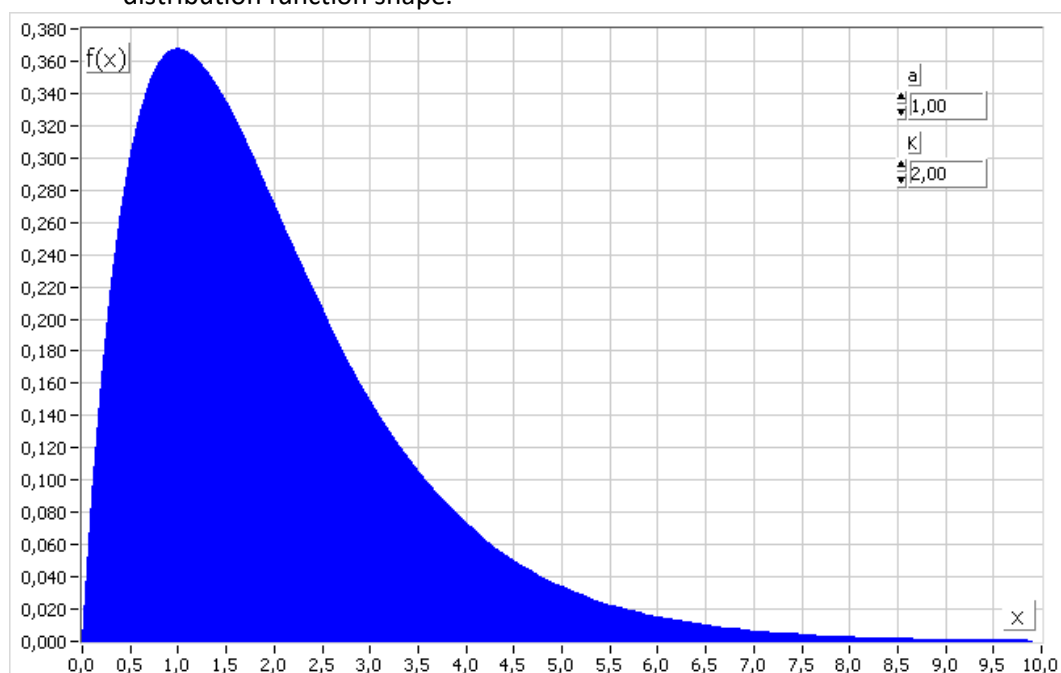
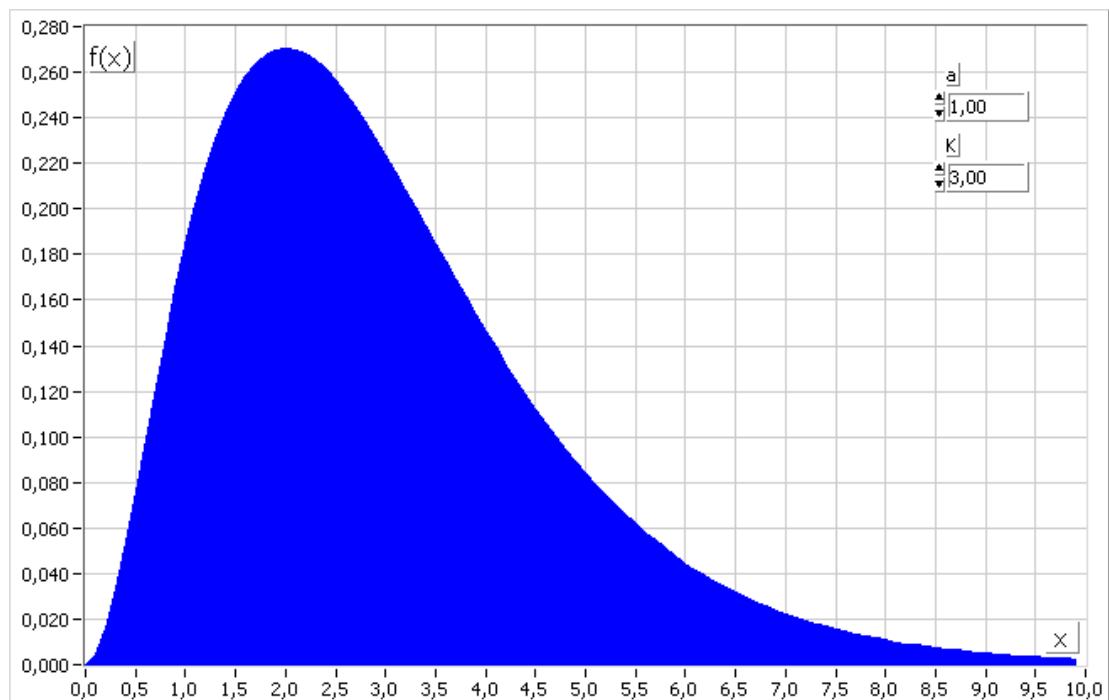
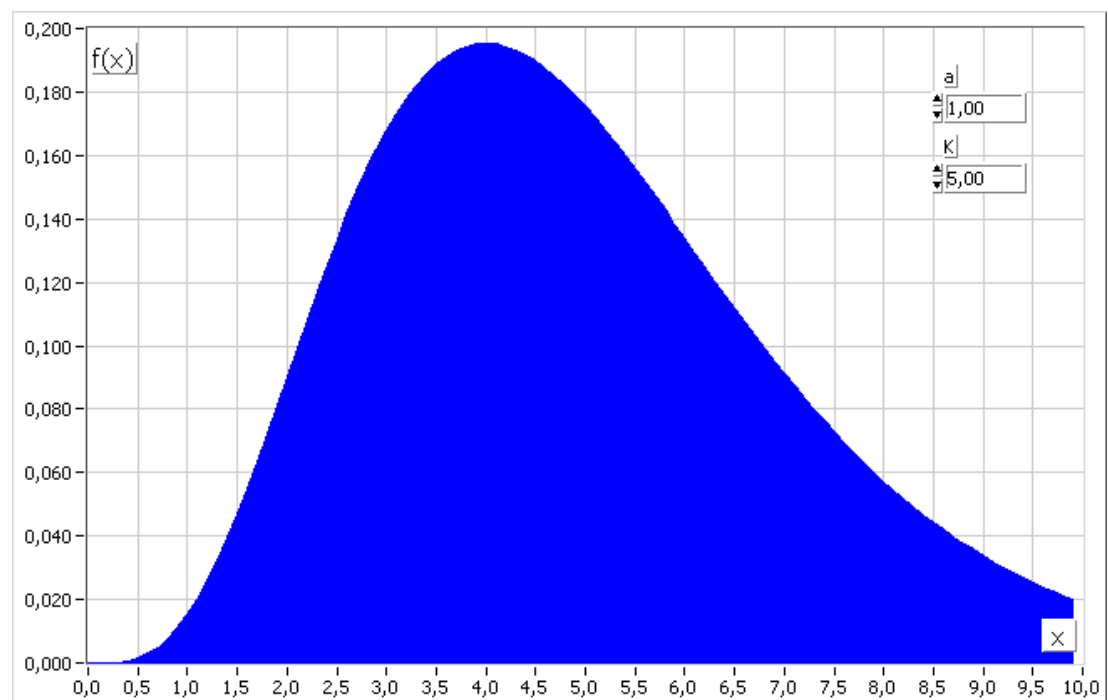


Figure 2.3.6.47 Density function of the Erlang distribution ($k=2$) (blue)**Figure 2.3.6.48** Density function of the Erlang distribution ($k=3$) (blue)**Figure 2.3.6.49** Density function of the Erlang distribution ($k=5$) (blue)

2.3.7 Empirically distributed probability density function (Empirical Distribution)

It provides the possibility of applying a probability density function established experimentally, based on measurement results. The sum of the probabilities for the given thresholds must be 1.0. This is accomplished by normalization by an algorithm that processes probabilities. For the density function shown in **Figure 2.3.7.50**, the probability of selecting values between 1.1 and 1.2 is zero (0) (because such a probability value can be).

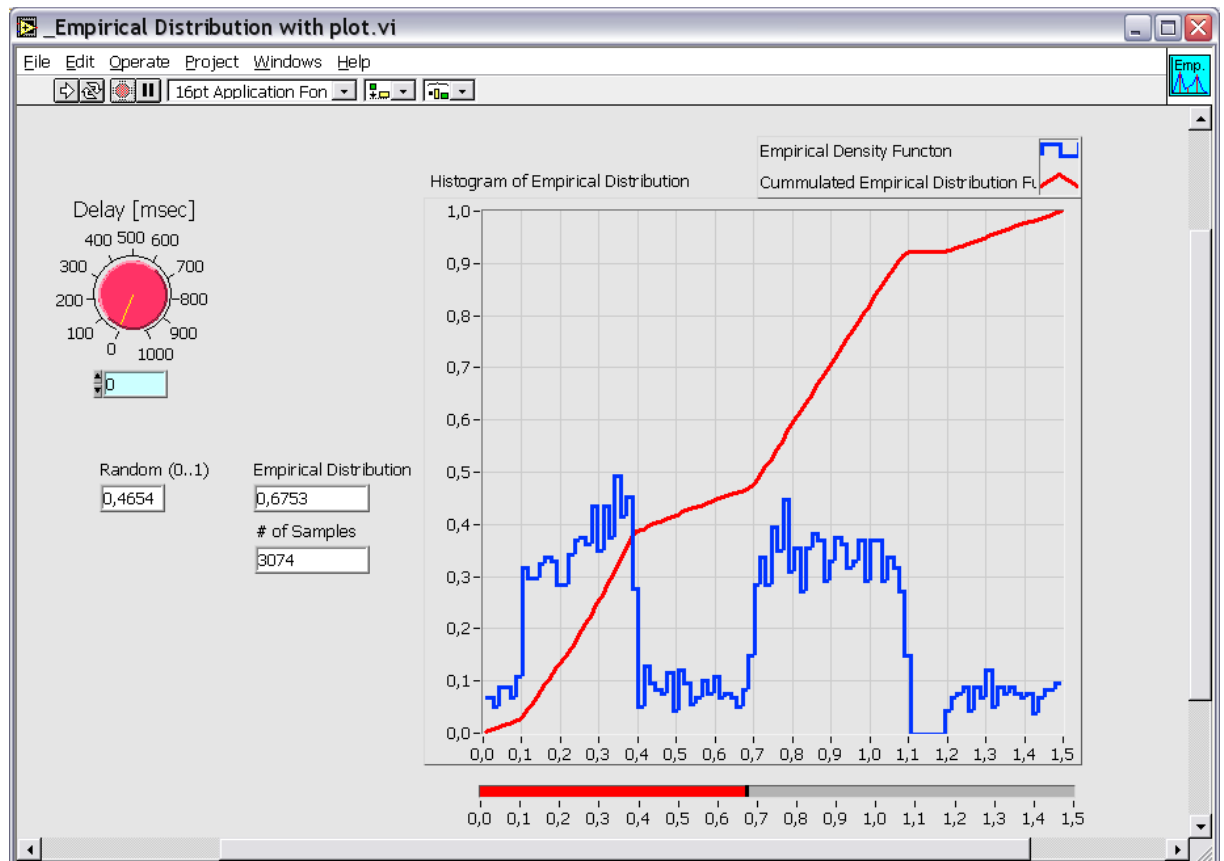


Figure 2.3.7.50 The probability density function of the empirical distribution (blue) and distribution function (red) for a real series of data

The empirical distribution definition functions:

Empirical Density = $f(x)$ table (2.3.27)

Empirical Distribution = $F(x)$ integral value based on the table (2.3.28)

Empirical mean = μ = from Table $F(x)$ by calculation (2.3.29)

Empirical Variance = σ = from Table $F(x)$ by calculation (2.3.30)

2.3.8 Table-based density function (Empirical Distribution)

- Generating the general density function requires a random number generator evenly distributed between 0..1.
- We create the desired **DIST FUNCTION**, -> specify the probability of occurrence for each input value. We can also give zero probability!
- Let us form the **INVERSE function of this distribution function** (analytically, numerically, tabularly).
- Using the random number generator as an independent variable of the inverse function, we created the random number generator with arbitrary distribution.
- Line 0. is the x values;
Line 1 is the probability values

0. sor x értéke											
1. sor valószínűség értéke											
0		0,00	0,10	0,30	0,40	0,70	0,80	1,10	1,20	1,30	1,60
		0,00	0,10	0,40	0,50	0,10	0,40	0,40	0,00	0,10	0,10

Figure 2.3.8.51 The empirical distribution density function values as a function of input x values

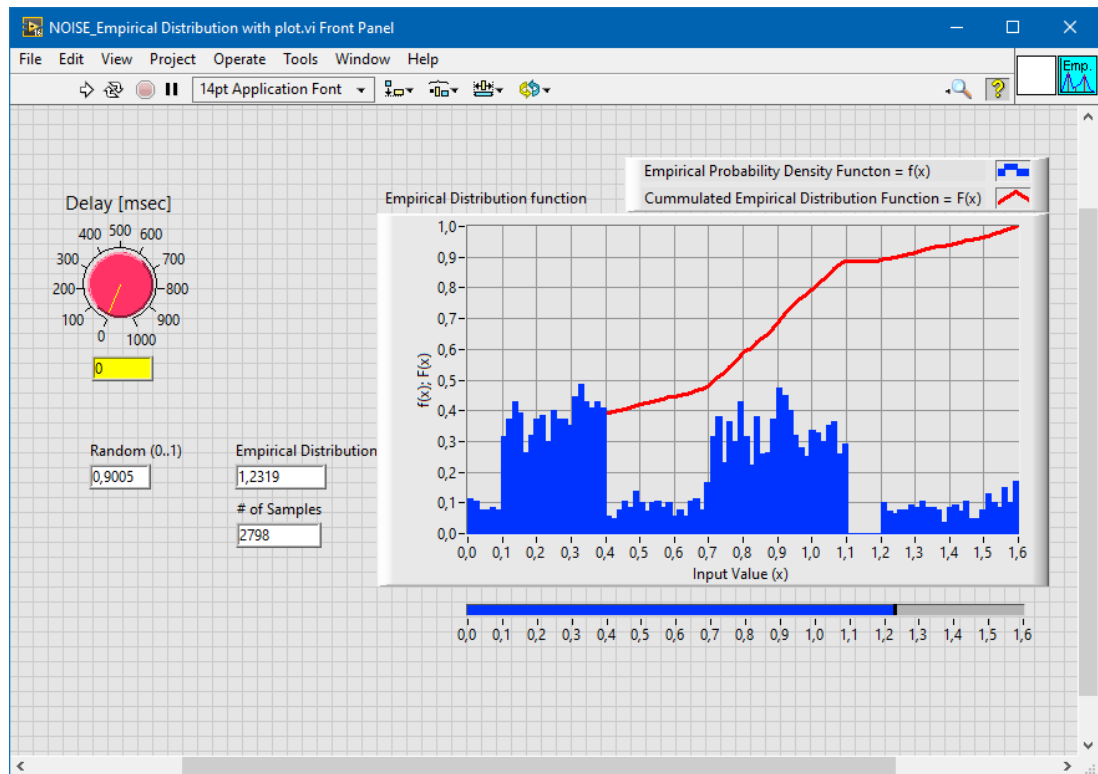


Figure 2.3.8.52 The probability density function of the empirical distribution (**blue**) and distribution function (**red**) for a real series of data

3. Discreet Event Simulator

DES objects

A DES Python (DESPy) it is an object-oriented simulation framework, which with the help of its objects provides an opportunity to build a complex stochastic network with minimal programming knowledge, which works with finite state automata.

The most important object of the simulation model is the branch object of type **TDES_BRANCH**, which contains the basic simulation elements (**TDES_OBJECT**) and their relationships (**TDES_CONNECTION**), as well as the vector of tasks ordered by execution time, which is built from **TDES_TASK** objects.

We use the attributes of the branch (**TDES_BRANCH**) to store the administrative parameters needed to run the simulation, such as the simulation end time or the current simulation time.

Branch (**TDES_BRANCH**) methods provide the ability to store, delete, or change attribute values according to specified conditions for individual objects (DES objects, Entities, relationships, tasks). Similarly, these methods ensure that we make all operations on objects programmatically simple. That is, most of the operations can be performed from naming the object to the name of the required procedure (function), as well as specifying the current parameters. Thus, any attribute of any object can be accessed or any of its methods can be run at any point in the simulation program.

In the following chapters we present the objects of DES Python, which implement the simulation model in a hierarchical order, building on each other, containing each other.

We provide the following information about objects:

- block diagram of the object,
- task of the object,
- create (define) the object in DES Python.

3.1 TDES_BRANCH object

3.1.1 The task of the TDES_BRANCH object

- The **TDES_BRANCH** object in the DES Python simulation system contains all the necessary objects, attributes, and methods to run a standalone simulation model.
- The **TDES_BRANCH** object contains the following main elements:
 - storage vector of **TDES_OBJECT** s, (**DESBranch_DESObjectList**)
 - storage vector of **TDES_CONNECTION**, (**DESBranch_DESConnectionList**)
 - storage vector of **TDES_TASK** s, (**DESBranch_DESTaskList**)
- The **owner** object of the TDES_BRANCH object is the **TDES_BRANCHLIST**.
 - If only a single **TDES_BRANCH** is run, then the owner object is (owner) = **None**.
 - If multiple TDES_BRANCH running in parallel, the owner object is (owner) = **TDES_BRANCHLIST** object.
- The **TDES_BRANCH** object has a name (**DESBranch_Name_str**) used by the simulation system to identify different TDES_BRANCH and a name that can be given by the user and closely related to the operation of a specific system (**DESBranch_Caption_str**).

3.1.2 Block diagram of TDES_BRANCH object

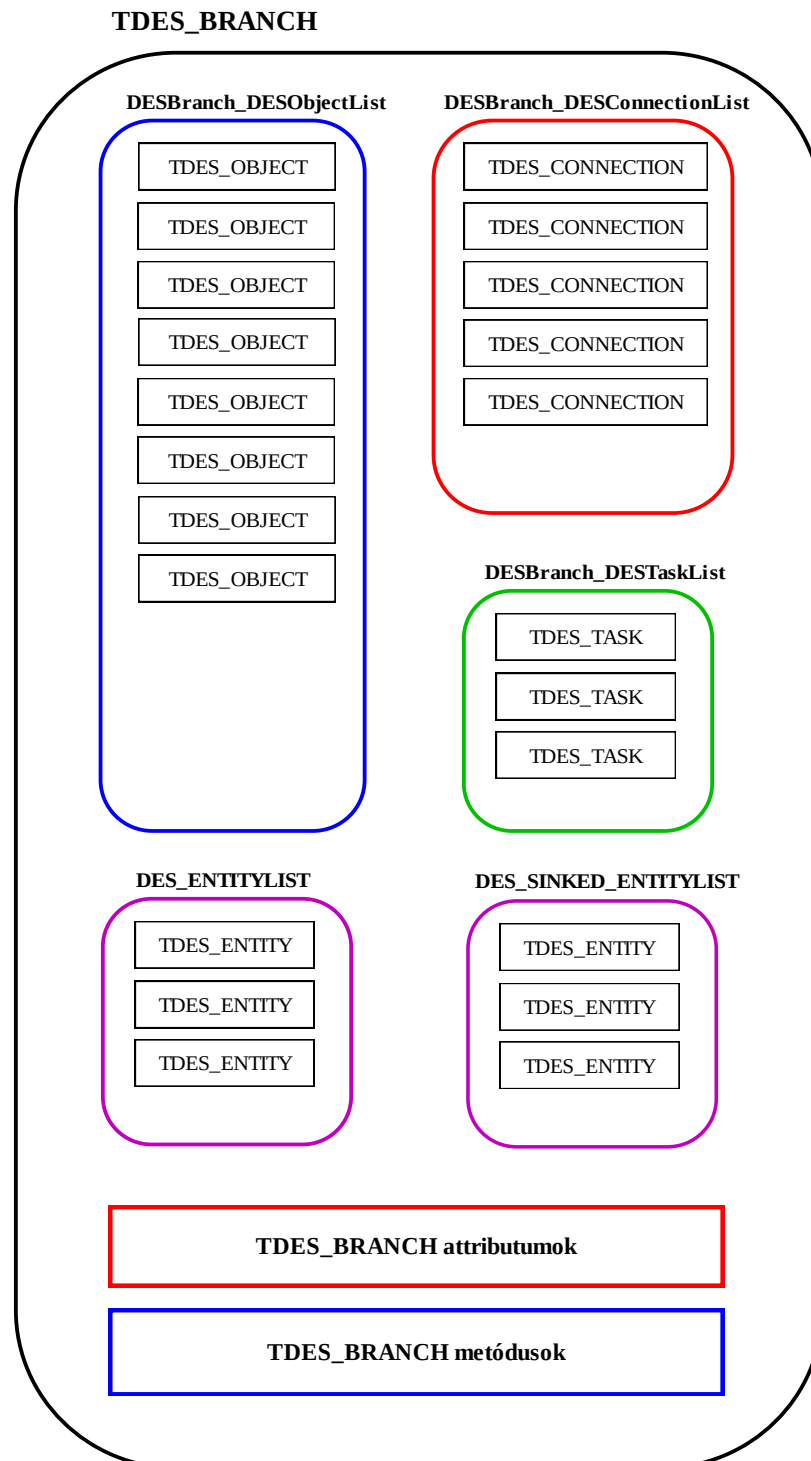


Figure 3.1.2.53 Block diagram of the TDES_BRANCH object

3.1.3 Defining the TDES_BRANCH Object

To create an object of type **TDES_BRANCH** in DES Python, do the following:

```
LBranch1 = TDES_BRANCH()
```

where:

LBranch1 The **TDES_BRANCH** object

3.1.4 **Attributes** of the TDES_BRANCH object

```
self. DESBranch_Owner_class
self. DESBranch_Name_str
self. DESBranch_Caption_str
self. DESBranch_ID_Number
self. DESBranch_Is_Enabled_bool

self. DESBranch_Cycle
self. DESBranch_Cycle_Divider

self. DESBranch_DESObjectList
self. DESBranch_Maximal_Length_of_DESObject_
self. DESBranch_DESConnectionList
self. DESBranch_DESConnectionList_IN
self. DESBranch_DESConnectionList_OUT
self. DESBranch_DESTaskList
self. DESBranch_Deleted_DESTask
self. DESBranch_Deleted_DESTask.DESTask_Owner_class
self. DES_ENTITYLIST
self. DES_ENTITYLIST.DESEntityList_Owner_class
self. DES_SINKED_ENTITYLIST
self. DES_SINKED_ENTITYLIST.DESEntityList_Owner_class

self. DESBranch_Simulationtime_Start
self. DESBranch_Simulationtime_Now
self. DESBranch_Simulationtime_End
self. DESBranch_Stop_Simulation_bool

self. DESBranch_TaskList_Empty_bool
self. DESBranch_Realtime_Actual
self. DESBranch_Realtime_Change

self. DESBranch_Model_Name_str
self. DESBranch_Author_str
self. DESBranch_Date_Of_Creation_str

self. ObjectCalculate_Start_Time
self. ObjectCalculate_Stop_Time
self. ObjectCalculate_Elapsed_Time
self. MoveRequest_Start_Time
self. MoveRequest_Stop_Time
self. MoveRequest_Elapsed_Time

self. Process_Start_Time
```

```
self. Process_Stop_Time
self. Process_Elapsed_Time

self. DESBranch_RealTime
self. DESBranch_Delay_Seconds
self. DESBranch_Delay_Switch_bool
self. DESBranch_Print_Error_bool
self. DESBranch_Step_By_Step_bool
self. DESBranch_All_Entity_Move_Requests_bool
self. DESBranch_Succesful_Entity_Move_Requests_bool
self. DESBranch_New_Entity_Insert_bool

self. DESBranch_Print_ObjectList_bool
self. DESBranch_Print_ObjectList_Short_bool
self. DESBranch_Print_EntityList_bool
self. DESBranch_Print_EntityList_Short_bool
self. DESBranch_Print_TaskList_bool
self. DESBranch_Print_GTime_Now_bool
self. DESBranch_Print_All_List_at_Calculation_Cycle_bool

self. DESBranch_Number_Of_Entity_Call
self. DESBranch_Number_Of_Source_Call
self. DESBranch_Number_Of_Buffer_Call
self. DESBranch_Number_Of_Machine_Call
self. DESBranch_Number_Of_Sink_Call
self. DESBranch_Number_Of_Wrapper_Call
self. DESBranch_Number_Of_UnWrapper_Call
self. DESBranch_Number_Of_Path_Call
self. DESBranch_Number_Of_Lock_Call
self. DESBranch_Number_Of_UnLock_Call
self. DESBranch_Summa_DESObject_Call

self. DESBranch_Number_of_Example
self. DESBranch_Number_Of_All_Calculation_Cycles
self. DESBranch_Number_Of_Process_Calculation_Cycles
self. DESBranch_Executed_Calculation_Cycles_till_Printing

self. DESBranch_Number_Of_Succesful_Entity_Move_Requests
self. DESBranch_Number_Of_All_Entity_Move_Requests

self. DESBranch_CSS_str
self. DESBranch_CSS_Last_Calculation_Time
self. TRACED_DESBranch_CSS_str_bool

self. Print_Model_DESObjectList_bool
self. Print_Model_DESConnectionList_bool
self. Print_Model_DESObject_DESChannelsList_bool
self. Print_Model_Start_DESTaskList_bool
self. Result_Files_Name_str
self. Print_EntityList_short_bool
self. Print_EntityList_full_bool
self. Print_ObjectList_short_bool
self. Print_ObjectList_summary_report_bool
self. Print_ObjectList_full_bool
self. Print_Model_DESTaskList_bool
self. Print_Sinked_EntityList_short_bool
self. Print_Sinked_EntityList_bool

self. DESPlot_Enabled_bool
self. DESPlot_Time_Delay_sec
```

```
self. DESPlot_Width_in_Characters
self. DESPlot_on_Display_bool
self. DESPlot_Numerical_Values_on_Display_bool
self. DESPlot_Graphical_Values_on_Display_bool
self. DESPlot_Graphical_and_Numerical_Values_on_Display_bool

self. TRACED_bool
self. TRACED_Start_Time
self. TRACED_End_Time
self. TRACED_Print_EntityList_short_bool
self. TRACED_Print_ObjectList_short_bool
self. TRACED_Print_TaskList_short_bool
self. TRACED_Print_MoveRequest_Entity_short_bool
self. TRACED_Time_Delay_sec
self. TRACED_Keyboard_Control_bool
self. TRACED_Lock_UnLock_Control_bool
self. TRACED_Path_Delay_Time_Calculation_bool
self. TRACED_Entity_Hystorical_System_Attribute_bool
self. TRACED_Calculate_Entities_Readiness_in_MACHINE_bool
self. TRACED_DES_BRANCH_Name_str
self. TRACED_DES_OBJECT_Name_str
self. TRACED_Accept_Entity_Capacity_Limit_Value_bool
self. TRACED_Print_DESObjectList_short_bool
self. TRACED_Print_BUFFERS_DESObjectList_short_bool
self. TRACED_Print_BUFFERS_FULL_and_Blocked_bool
self. TRACED_Print_UNIQUE_DESObjects_short_bool
self. TRACED_DES_BRANCH_Name_str
self. TRACED_DES_OBJECT_Name_list
self. TRACED_Print_DESObject_Commanded_State_Changed_bool
self. Creates_Gantt_diagram_Line_of_DES_OBJECTs_bool

self. LSource
self. LBuffer
self. LMachine
self. LSink
self. LWrapper
self. LUnWrapper
self. LPath
self. LLock
self. LUnLock

self. DESObject_By_Name_dict
self. DESObject_By_ID_Number_dict
self. DESObject_By_Index_dict
```

3.1.5 Methods of TDES_BRANCH Object

DESBranch_Calculate_Entities_Readiness_in_MACHINE
DESBranch_Calculate_Last_Calculation_Time_of_All_DESObjects
DESBranch_Calculate_Next_DESTask
DESBranch_Calculate_Next_State_Of_BUFFER
DESBranch_Calculate_Next_State_Of_ENTITY
DESBranch_Calculate_Next_State_Of_LOCK
DESBranch_Calculate_Next_State_Of_MACHINE
DESBranch_Calculate_Next_State_Of_PATH
DESBranch_Calculate_Next_State_Of_SINK
DESBranch_Calculate_Next_State_Of_SOURCE
DESBranch_Calculate_Next_State_Of_UNLOCK
DESBranch_Calculate_Next_State_Of_UNWRAPPER
DESBranch_Calculate_Next_State_Of_WRAPPER
DESBranch_Calculate_Of_DESObject_Next_State

DESBranch_Call_DESBranch_Procedure
DESBranch_Call_DESObject_Procedure

DESBranch_Connected_Input_DESObject_Of
DESBranch_Connected_Output_DESObject_Of
DESBranch_Connection_Index_in_DESConnectionList

DESBranch_Creates_Gantt_diagram_Line_of_DES_OBJECTs
DESBranch_Define_DES_Connection_key
DESBranch_Delete_DES_CONNECTION_From_DESConnectionList
DESBranch_Delete_DES_TASK_From_DESTaskList
DESBranch_Delete_DESObject_From_DESObjectList
DESBranch_Delete_ID_Number_From_ContentVector
DESBranch_Delete_Task_from_DESBranch_TaskList
DESBranch_DES_Print_ContentVector
DESBranch_DES_TASK_At_Index

DESBranch_DESObject_By_ID_Number
DESBranch_DESObject_By_Index
DESBranch_DESObject_By_Name
DESBranch_DESObject_ID_Number_To_Index
DESBranch_DESObject_ID_Number_To_Name
DESBranch_DESObject_Index_To_ID_Number
DESBranch_DESObject_Index_To_Name
DESBranch_DESObject_Name_To_ID_Number
DESBranch_DESObject_Name_To_Index

DESBranch_Draw_Content_Entities_Vector_Occupancy
DESBranch_Erase_DESObject_from_DESObjectList

DESBranch_FillUp_DESObject_Channels_With_Connected_Channels_Information
DESBranch_FillUp_DESObject_Channels_with_System_Name_Information
DESBranch_FillUp_DESObject_InputChannels_With_Connected_OutputChannels_Information
DESBranch_FillUp_DESObject_OutputChannels_With_Connected_InputChannels_Information
DESBranch_FillUp_DESObjectList_Of_Objects_With_Connected_Channels_Information
DESBranch_Flush_of_DESObject_Time_In_States_of_All_DESObject
DESBranch_Get_Only_The_Next_Entity_Of_DESObject_ContentVector

DESBranch_Initiate
DESBranch_Initiate_DESObjectList
DESBranch_Initiate_DESPlot_Vector
DESBranch_Initiate_DESTaskList

DESBranch_Insert_DES_CONNECTION_Into_DESConnectionList
DESBranch_Insert_DES_TASK_Into_DESTaskList_As_FIRST
DESBranch_Insert_DES_TASK_Into_DESTaskList_As_LAST
DESBranch_Insert_DES_TASK_Where_Input_Data_Exists
DESBranch_Insert_DES_TASK_Where_Output_Data_Exists
DESBranch_Insert_DESObject_Into_DESObjectList
DESBranch_Insert_Entity_Into_DESObject_ContentVector
DESBranch_Insert_First_DES_TASK_Of_SOURCES_Into_DESTaskList
DESBranch_Is_There_Any_Duplicated_Connection_In_DESConnectionList
DESBranch_Is_There_Any_Duplicated_ObjectName_In_DESObjectList

DESBranch_Load_Model_From_File
DESBranch_Message_to_All_OutputChannel_Connected_Objects
DESBranch_Move_Entity_Request_From_All_InputChannels
DESBranch_Move_Entity_Request_From_All_OutputChannels
DESBranch_ON_AFTER_ENTITY_ENTERED_into_DESObject
DESBranch_ON_AFTER_ENTITY_ENTERED_into_InputChannel_of_DESObject
DESBranch_ON_BEFORE_ENTITY_EXITED_from_DESObject
DESBranch_ON_BEFORE_ENTITY_EXITED_from_OutputChannel_of_DESObject
DESBranch_ON_ENTITY_SELF_MANAGED_OutputChannel_Index_Setting
DESBranch_ON_EXTERNAL_DISTRIBUTION_of_DESObject
DESBranch_ON_EXTERNAL_ENTITY_SETTING_at_SELF_MANAGED_operation_to_SOURCE_DESObject
DESBranch_ON_SIMULATION_TIME_RUNNING_FUNCTIONS
DESBranch_ON_STATISTICAL_CALCULATION_after_Simulation
DESBranch_ON_STATISTICAL_CALCULATION_in_time_of_Simulation
DESBranch_ON_SWITCH_DESObject_INTO_New_Commanded_State

DESBranch_Plot_DESPlot_Vector
DESBranch_Plot_DESPlot_Vector_Numeric
DESBranch_Plot_DESPlot_Vector_Update

DESBranch_Print_BUFFERS_DESObjectList_short
DESBranch_Print_BUFFERS_FULL_and_Blocked
DESBranch_Print_Content_Entities_Vector_Occupancy
DESBranch_Print_DES_CHANNEL
DESBranch_Print_DES_CONNECTION
DESBranch_Print_DES_Element_by_ID_Number
DESBranch_Print_DES_OBJECT
DESBranch_Print_DES_OBJECT_Short
DESBranch_Print_DES_TASK
DESBranch_Print_DESConnectionList
DESBranch_Print_DESObjectList
DESBranch_Print_DESObjectList_Short
DESBranch_Print_DESObjectList_Summary_Report
DESBranch_Print_DESPlot_Vector_AFTER_SIMULATION
DESBranch_Print_DESPlot_Vector_BEFORE_SIMULATION
DESBranch_Print_DESPlot_Vector_Minimum_Time_Step
DESBranch_Print_DESTaskList
DESBranch_Print_IDNumbers_of_ContentVector
DESBranch_Print_INPUT_OUTPUT_DES_CHANNELS_Of_All_DESObjects
DESBranch_Print_INPUT_OUTPUT_DES_CHANNELS_Of_DESObject
DESBranch_Print_UNIQUE_DESObjects_short

DESBRanch_Search_DESPlot_Vector_Printing_Parameters
DESBRanch_Str_of_Model_DESObjects_Actual_Parameters
DESBranch_TENTITY_Move_Request

3.2 TDES_CHANNEL object

3.2.1 The task of the TDES_CHANNEL object

- The **TDES_CHANNEL** object is the input and output of DES objects (**TDES_OBJECT**) in the DES Python simulation system connection object.
- This object temporarily stores (as an output object) and receives (as an input object) Entity objects in the simulation system.
- The **TDES_CHANNEL** object can store one Entity.

The **owner** object of the **TDES_CHANNEL** object is the **TDES_OBJECT**, which means that without the **TDES_OBJECT** this object cannot functioning!

- The **TDES_CHANNEL** object has a name (**DESChannel_Name_str**) or a name that can be given by the user and closely related to the operation of a specific system (**DESChannel_Caption_str**). However, these are used less frequently, as channels are usually referred to as the i^{th} input channel or j^{th} output channel of a DES object.
- An output **TDES_CHANNEL** can use the **TDES_CONNECT** object to connect to an input **TDES_CHANNEL**. Therefore, when uploading the data necessary for the operation of the program, each TDES_CHANNEL contains the most important parameters of the related TDES_CHANNEL.

3.2.2 Block diagram of TDES_CHANNEL object

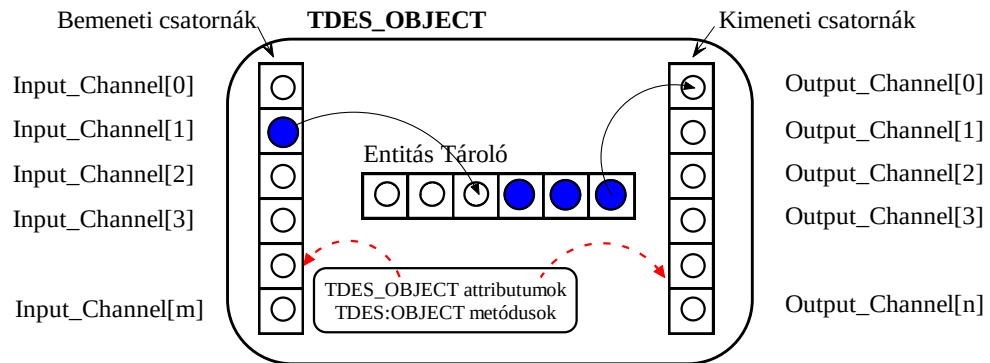


Figure 3.2.2.54 The TDES_CHANNEL object as an element of the TDES_OBJECT

The **Figure 3.2.2.54 TDES_OBJECT** Input and output connections are provided by input and output channels (**TDES_CHANNEL**-s)

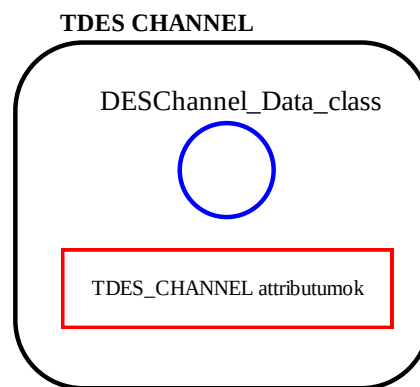


Figure 3.2.55 Block diagram of an TDES_CHANNEL object

The object's **DESChannel_Data_class** attribute is a pointer that always points to an **TDES_ENTITY** object or has a value of **None**.

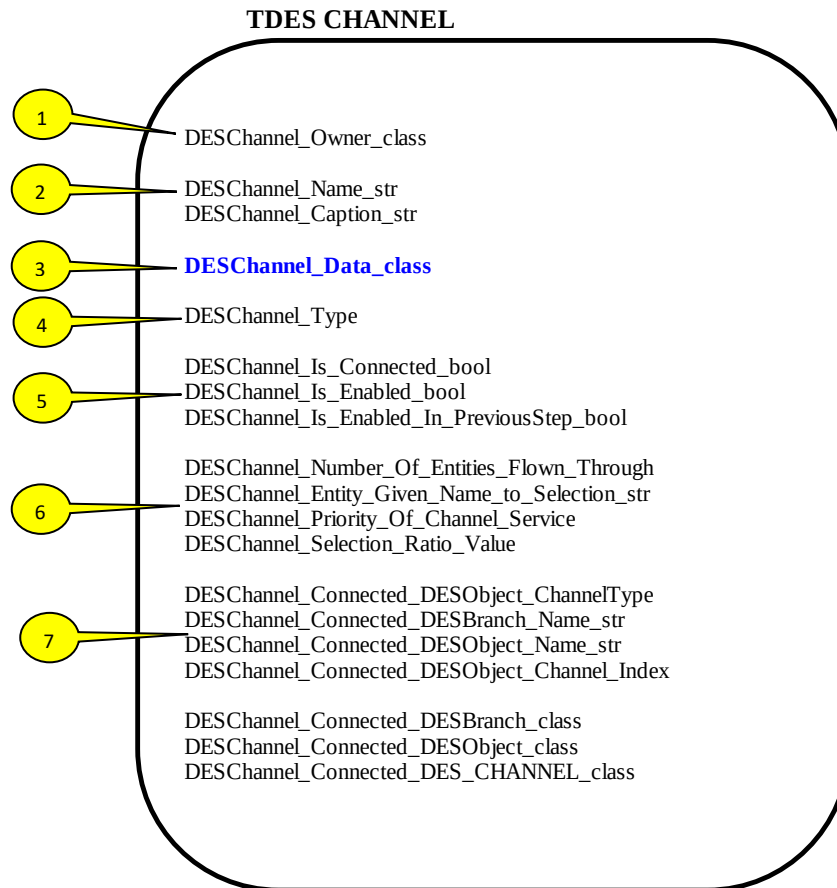


Figure 3.2.2.56 Attributes of the TDES_CHANNEL object

1. The **TDES_CHANNEL** owner object (**`DESSchannel_Owner_class`**) is always a **TDES_OBJECT** object to which the channel object belongs directly.
2. It has name (**`DESSchannel_Name_str`**) and special name (**`DESSchannel_Caption_str`**) attributes to identify the channel. They primarily provide for the possibility of identical management of objects. These properties are not currently applied by DES Python to simulation tasks!
3. The data in the channel is contained in the **`DESSchannel_Data_class`** attribute, which always points to a **TDES_ENTITY** object or to an empty object (**`None`**).

4. Specify the channel type, whether it's an *input channel* or an *output channel*.
5. This group contains the Boolean attributes that you can use to set channel connectivity and permission. Linking means that the channel is connected to another channel. Authorization is a very important attribute of the channel because it is the Boolean variable used to allow (prevent) an entity from entering or exiting the channel.
6. These attributes are required for the channel to function. They are described in detail in Chapter 5 in the TDES_CHANNEL attributes.
7. Information about another channel related to the channel (if connected). The identification of the related channel is also given by naming the related branch, naming the related DES object, and the index value of the input (output) channel. The **DESChannel_Connected_DESObject_ChannelType** attribute specifies whether the related channel is of input or output type.

3.2.3 Defining the TDES_CHANNEL Object

To create an object of type **TDES_CHANNEL** in DES Python, do the following:

```
LChannel = TDES_CHANNEL()
```

The following program excerpt shows how input channels for a **TDES_OBJECT** is created when defining **TDES_OBJECT**.

The **self**-attribute is the pointer to the current (just defined) **TDES_OBJECT**.

Number of input channels (**self.DESObject_Number_Of_InputChannels**).

In the for loop, each channel is first created, then its basic attributes are set, and then placed in the vector (**DESObject_Inputs**) of the input channels.

```
self.DESObject_Inputs = []
for i in range(self.DESObject_Number_Of_InputChannels):
    DES_Channel = TDES_CHANNEL()
    DES_Channel.DESChannel_Owner_class = self
    DES_Channel.DESChannel_Type = TChannel_Input
    DES_Channel.DESChannel_Connected_DESObject_ChannelType =
TChannel_Output
    self.DESObject_Inputs.append(DES_Channel)
```

3.3 TDES_CONNECTION object

3.3.1 The task of the TDES_CONNECTION object

- The **TDES_CONNECTION** object included in DES Python simulation system *DES objects* **TDES_CHANNEL** *Creates a connection between its output and input connection objects (channels).*

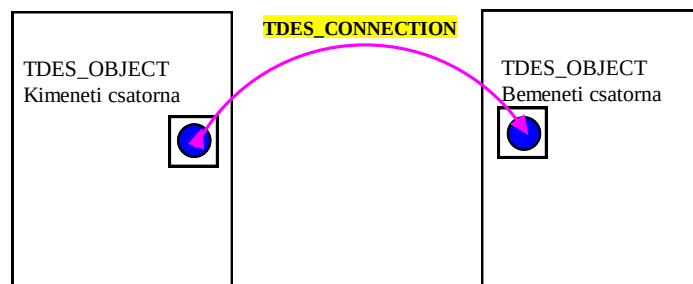


Figure 3.3.1.57 The TDES_CONNECTION object

- This object allows an output channel object (**TDES_CHANNEL**) in the simulation system to pass the Entity object stored in it to the input channel object (**TDES_CHANNEL**) attached to it.
- The **TDES_CONNECTION** object *can implement the passing of an Entity.*
- The **owner** object of the **TDES_CONNECTION** object is the **TDES_BRANCH**, which means that without the **TDES_BRANCH** this object cannot function!
- The **TDES_CONNECTION** object has a name (**DESConnection_Name_str**) or a name that can be given by the user and closely related to the operation of a specific system (**DESConnection_Caption_str**). However, they are used less frequently, since connections are usually referred to in the:
 - output channel DES branch (**TDES_BRANCH**) naming,
 - output channel DES object (**TDES_OBJECT**) naming,
 - output channel DES object index,
 - name of input channel DES branch (**TDES_BRANCH**),
 - input channel DES object (**TDES_OBJECT**) naming,
 - input channel DES object index

parameters.

1.3.2 Block diagram of the TDES_CONNECTION object

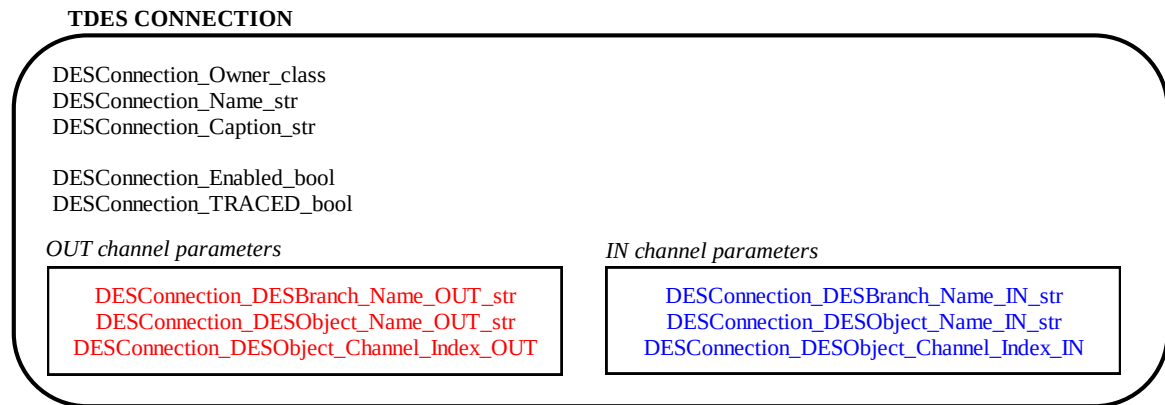


Figure 3.3.2.58 Block diagram of the TDES_CONNECTION object

3.3.3 Defining the TDES_CONNECTION Object

To create an object of type **TDES_CONNECTION** in DES Python, do the following:

```
LConnection = TDES_CONNECTION()
```

The following program excerpt shows how input and output channels for a **TDES_OBJECT** is specified when defining an **TDES_CONNECT** object.

In this example, Branch is a pointer to **TDES_BRANCH**. In the last line of the program fragment, the newly created **TDES_CONNECT** object is inserted into the **DESBranch_DESConnectionList** container (vector) of the Branch object.

```
DES_Connection = TDES_CONNECTION()
DES_Connection.DESConnection_DESBranch_Name_OUT_str=Branch.DESBranch_Name_str
DES_Connection.DESConnection_DESObject_Name_OUT_str = 'Source1'
DES_Connection.DESConnection_DESObject_Channel_Index_OUT = 0

DES_Connection.DESConnection_DESBranch_Name_IN_str =
Branch.DESBranch_Name_str
DES_Connection.DESConnection_DESObject_Name_IN_str = 'Buffer1'
DES_Connection.DESConnection_DESObject_Channel_Index_IN = 0

DES_Connection.DESConnection_Enabled_bool = True
DES_Connection.DESConnection_TRACED_bool = False

Branch.DESBranch_Insert_Connection_Into_DESConnectionList(DES_Connection
,)
```

3.4 TDES_OBJECT object

3.4.1 The task of the TDES_OBJECT object

- The **TDES_OBJECT** object in the DES Python simulation system discrete event action object.
- Operations are performed by **TDES_ENTITY** objects, which can be as follows:
 - Create Entity (**TSOURCE**),
 - Store of Entities (**TBUFFER**),
 - Delay Entity (**TMACHINE**),
 - Wrap an Entity in another Entity (**TWRAPPER**),
 - Unwrap an Entity from another Entity (**TUNWRAPPER**),
 - Deprovisioning, removing an Entity from the simulation system (**TSINK**),
 - Entity traverses a multilane path (staging + delay) (**TPATH**),
 - Restrict an entity from entering a specific part of the model (**TLOCK, TUNLOCK**).
- The **owner** object of the **TDES_OBJECT** object is the **TDES_BRANCH**, which means that without the **TDES_BRANCH** this object cannot functioning!
- The **TDES_OBJECT** object is named (**self.DESObject_Name_str**) used by the simulation system to identify **TDES_OBJECT** or by a name that can be given by the user and closely related to the operation of the specific system (**self.DESObject_Caption_str**). This second name is used only by the user and is not used.

3.4.2 Block diagram of TDES_OBJECT object

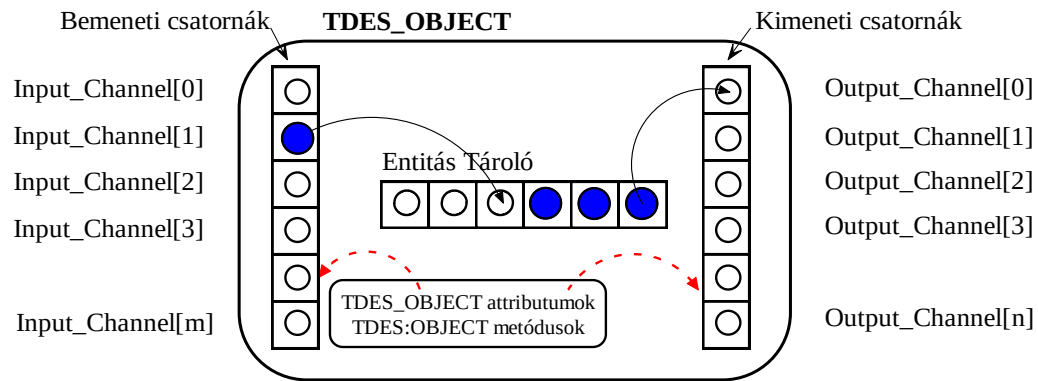


Figure 3.4.2.59 Block diagram of the TDES_OBJECT object

The defining elements of a **TDES_OBJECT** object *are the input and output channels*, which are objects of **TDES_CHANNEL** type. An equally important element of the object is the Entity container (**DESObject_Number_Of_Content_Entities**). The Entity container contains the Entities stored in the DES object.

The **TDES_OBJECT** is structured in such a way that by specifying its type (**DESObject_Type**), the **TDES_OBJECT** object can be any DES object of the configurable type. This means that all attributes of DES objects and all attributes of special objects are contained in all objects. This may seem like a waste of memory, but it makes managing and operations for DES objects extremely easy.

3.4.3 Defining the TDES_OBJECT Object

To create an **object** of type **TDES_OBJECT** in DES Python in the following way:

```
LBuffer1 = TDES_OBJECT(  
    TBUFFER,      # Type of DES object  
    'Buffer1',    # Name DES object  
    6,            # Number of input channels  
    6             # Number of output channels  
)
```

where:

LBuffer	the created TDES_OBJECT naming a pointer with a TDES_OBJECT type object
TBUFFER	the TDES_OBJECT type
'Buffer1'	The reference name of the object in the simulation program
6,	the number of input channels to the object
6,	Number of output channels of the object

3.4.1 TSOURCE object

3.4.1.1 The task of the TSOURCE object

- The **TSOURCE** *DES* object is responsible for Entity objects (**TDES_ENTITY**) emit into the simulation system model.
- The **TSOURCE** object has no input channels.
- After you create the **TSOURCE** object, you place it in a Python list object and reference it in the simulation program by the name of the DES object (for example, 'Source1'), its ID_Number value, or its index in DESObjectList.
- The **TSOURCE** object is **self.SOURCE_Time_Step** with a specified period parameter, it emits (creates) a **TDES_ENTITY** object, which is introduced into the simulation system, **self.DESObject_Capacity** = 1.

If the **self.DESObject_Capacity** > is 1 and *integer*, **TSOURCE** emits as many Entities as self at the time of issue of the **Entity.DESObject_Capacity** value. If you haven't run out of Entities from TSOURCE by the next Entity issuance date, you will only create enough Entities so that **self.DESObject_Content_Entities_Vector** count of Entities plus count of newly created Entities is **self.DESObject_Capacity** value.

It only creates so many Entities that it is always **self.DESObject_Capacity** number of Entities must be at the time the Entities are issued.

- The **TSOURCE** object provides the parallel CSS (CSS = Continuous Simulation System) system with the ability to update the objects of the CSS system at the given simulation time.

3.4.1.2 Block diagram of TSOURCE object

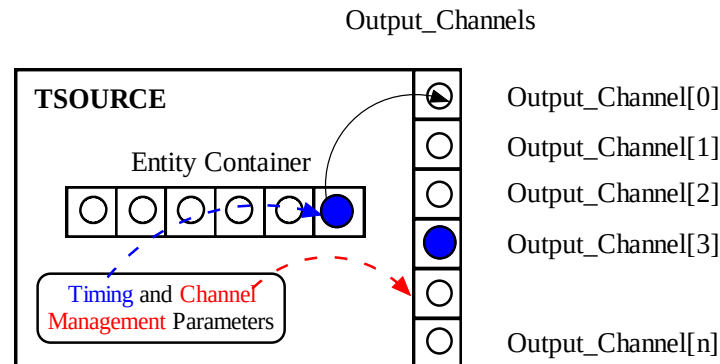


Figure 3.4.1.2.60 Block diagram of the TSOURCE object

3.4.1.3 Defining the TSOURCE Object

To create a DES object of type **TSOURCE** in DES Python as follows:

```
LSource = TDES_OBJECT(
    TSOURCE,          # Type of DES object,
    'Source1',        # Name the DES object,
    0,                 # Number of input channels,
    6                  # Number of output channels
)
```

where:

LSource	the name of the created TDES_OBJECT , which is a pointer to an object of type TDES_OBJECT ,
TSOURCE	Type of TDES_OBJECT
'Source1'	The reference name of the object in the simulation program
0,	the number of input channels to the object
6,	Number of output channels of the object

An object of type **TSOURCE** *has no input channels*, since its main task as an Entity generator is to create and emit entities based on input parameters. Therefore, we have given 0 as the input channel number, but the program does not use this value and takes it as zero (0).

The output channel number is 6 in the previous sample example, but this parameter value can be any positive integer.

3.4.2 TBUFFER object

3.4.2.1 The task of the TBUFFER object

- That **TBUFFER** *DES* object is responsible for Entities (**TDES ENTITY**) temporarily store in the simulation system model.
- After creating the **TBUFFER** object, it is placed in a Python list object and referenced in the simulation program by the name of the DES object (for example, 'Buffer1'), its ID_Number value, or its index in DESObjectList.
- The **TBUFFER** object implements staging storage of entity objects received at its input,
 - if they cannot proceed further in the simulation system due to the occupancy of the object linked to the output.
 - The **TBUFFER** object has a **self.DESObject_Capacity** parameter specifies the maximum number of Entities that can be stored in **TBUFFER** object.

3.4.2.2 Block diagram of the TBUFFER object

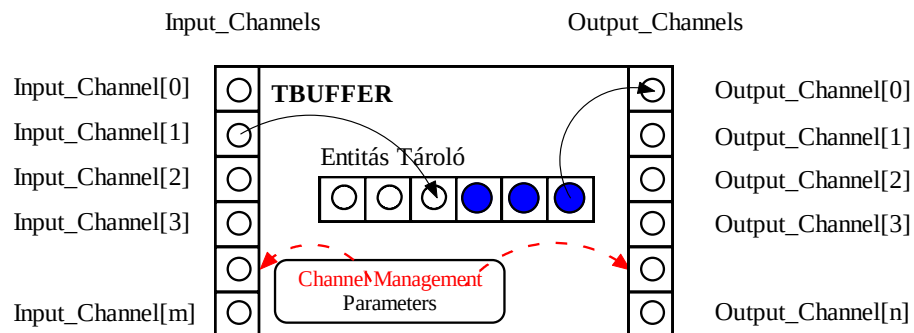


Figure 3.4.2.2.61 Block diagram of the TBUFFER object

3.4.2.3 Defining the TBUFFER Object

To create a DES object of type **TBUFFER** in DES Python as follows:

```
LBuffer = TDES_OBJECT(
    TBUFFER,          # Type of DES object,
    'Buffer1',        # Name the DES object,
    6,                # Number of input channels,
    6                  # Number of output channels
)
```

where:

LBuffer	the name of the created TDES_OBJECT , which is a pointer to an object of type TDES_OBJECT ,
TBUFFER	Type of TDES_OBJECT
'Buffer1'	The reference name of the object in the simulation program
6,	the number of input channels to the object
6,	Number of output channels of the object

An object of type **TBUFFER** has input and output channels.

The input channel number is 6 in the previous sample example, but this parameter value can be any positive integer.

The output channel number is 6 in the previous sample example, but this parameter value can be any positive integer.

3.4.3 TMACHINE object

3.4.3.1 The task of the TMACHINE object

- That **TMACHINE** *DES object is responsible for delay the progress of an Entity (TDES ENTITY) object by a specified amount of time in the simulation system model.*
- After the **TMACHINE** object is created, it is placed in a Python list object and referenced in the simulation program by the name of the DES object (for example, 'Machine1'), its ID_Number value, or its index in DESObjectList.
- The **TMACHINE** object is **self.MACHINE_Time_Step** parameter delays the progress of the Entity object received at its input in the simulation system by a specified amount of time.
- The object is **self.DESObject_Capacity** attribute, which must be a positive integer 1 or greater, and specifies how many TMACHINE objects will functioning in parallel.

3.4.3.1 Block diagram of the TMACHINE object

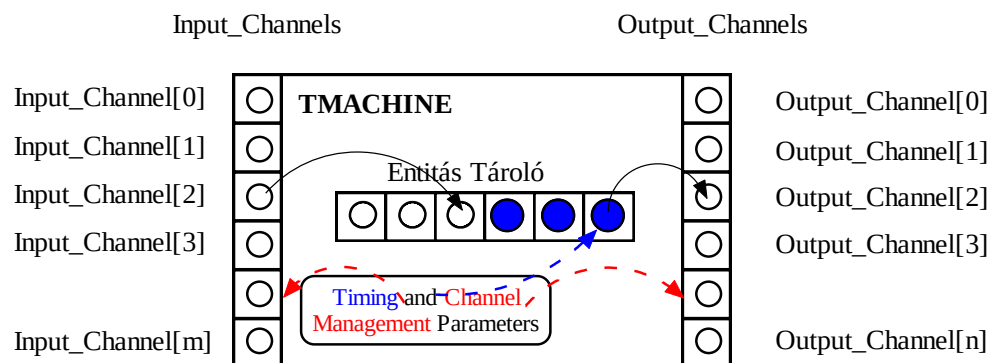


Figure 3.4.3.1.62 Block diagram of the TMACHINE object

3.4.3.3 Defining the TMACHINE Object

To create a DES object of type **TMACHINE** in DES Python as follows:

```
LMachine = TDES_OBJECT(
    TMACHINE,      # Type of DES object,
    'Machine1',    # Name the DES object,
    12,            # Number of input channels,
    4              # Number of output channels
)
```

where:

LMachine	the name of the created TDES_OBJECT , which is a pointer to an object of type TDES_OBJECT ,
TMACHINE	Type of TDES_OBJECT
'Machine1'	The reference name of the object in the simulation program
12,	the number of input channels to the object
4,	Number of output channels of the object

The object of type **TMACHINE** has input and output channels.

The input channel number is set to 12 values in the previous sample example, but this parameter value can be any positive integer.

The output channel number is set to 4 in the previous sample example, but this parameter value can be any positive integer.

3.4.4 TSINK object

3.4.4.1 The task of the TSINK object

- The **TSINK** *DES object task, delete Entity (**TDES ENTITY**) object from the simulation system model.*
- The **TSINK** object *has only input channels.*
- After you create a **TSINK** object, you place it in a Python list object and reference it in the simulation program by the name of the DES object (for example, 'Sink1'), its ID_Number value, or its index in DESObjectList.
- The **TSINK** object terminates (deletes) Entity objects received at its input, but if the Entity object received at the input contains additional Entity objects (or they may contain additional Entity objects), the **TSINK** object *removes all Entity objects from the system.*

3.4.4.2 Block diagram of TSINK object

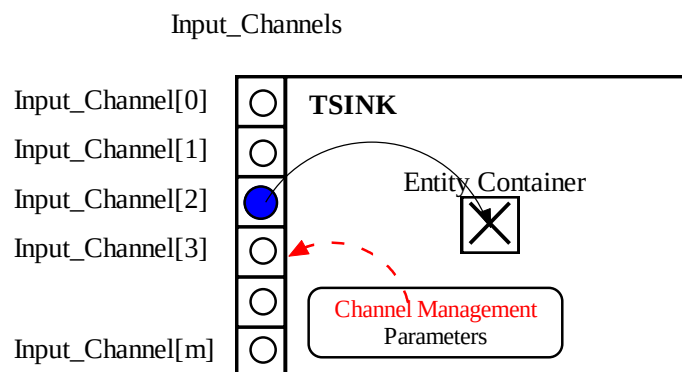


Figure 3.4.4.2.63 Block diagram of the TSINK object

3.4.4.3 Defining the TSINK Object

To create a DES object of type **TSINK** in DES Python in the following way:

```
LSink = TDES_OBJECT(
    TSINK,          # Type of DES object,
    'Sink1',        # Name the DES object,
    8,              # Number of input channels,
    0               # Number of output channels
)
```

where:

LSink	Name the created TDES_OBJECT , which is a pointer of a TDES_OBJECT type object
TSINK	Type of TDES_OBJECT
'Sink1'	The reference name of the object in the simulation program
8,	the number of input channels to the object
0,	Number of output channels of the object

The **TSINK** object *has only input channels* because it terminates (deletes) incoming Entities in the simulation system. Entities do not advance beyond the model but exit it.

The input channel number is set to 8 in the previous sample example, but this parameter value can be any positive integer.

The output channel count in the previous sample example is set to 0 because this DES object has NO OUTPUT and this value is not used.

3.4.5 TWRAPPER object

3.4.5.1 The TWRAPPER Object Task

- That **TWRAPPER** DES object is responsible for Entity (**TDES_ENTITY**) objects wrap together into another Entity in the simulation system model.
 - The **TWRAPPER** object creates a model of a box in which a specific number of parts per channel is placed from different inputs. In the following DES objects, only the box Entity will be moved, but the box Entity will naturally contain (remain) the packaged part Entities.
- After creating the **TWRAPPER** object, it is placed in a Python list object and referenced in the simulation program by the name of the DES object ('Wrapper1'), its ID_Number value, or its index in DESObjectList.
- The **TWRAPPER** object implements the packaging of Entity objects received at its input,
 - The **TWRAPPER** object waits for its inputs to arrive first with a **Package** (box Entity) object (type **TDES_ENTITY**) on input 0, and then a specified amount of **TDES_ENTITY** objects (**WRAPPER_Request_At_Channel[i]**) on the different input channels (component entities).
 - Input with index 0 (zero) arrives at the container box Entity (**Package**). The (**i =1..self.DESObject_Number_Of_InputChannels**) inputs arrive at the part entities to be packaged. The quantities to be packed required for the input channels are determined by the **shelf.WRAPPER_Request_At_Channel[i]** vector.
 - **TDES_ENTITY** objects contain the channel through which they were received in the **TWRAPPER** object in the **Wrapper_Channel_Number_Of_Arrive** user attribute.
 - The **self.DESObject_Outputs[0]** leaves the packaged Entity (box = **Packed_Entity**).

Operational notes:

=====

1. Entities wrapped with the **TWRAPPER** object can be unpacked ONLY with the **TUNWRAPPER** object!
2. The **self.New_Name_of_Package_str** contains the new name of the wrapped object. If the string is empty (''), does not made Package object name change, otherwise the Package object name will change to the specified new name.

2.4.5.2 Block diagram of TWRAPPER object

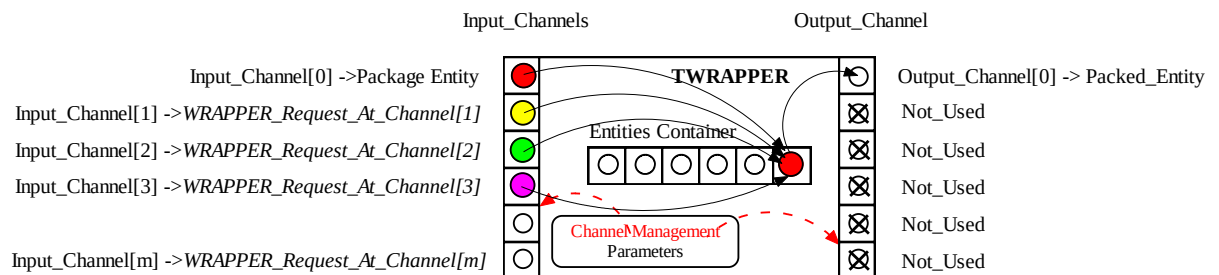


Figure 3.4.5.2.64 Block diagram of TWRAPPER object (15-16)

3.4.5.3 Defining the TWRAPPER Object

To create a DES object of type **TWRAPPER** in DES Python as follows:

```
LWrapper = TDES_OBJECT(
    TWRAPPER,          # Type of DES object,
    'Wrapper1',        # Name the DES object,
    6,                  # Number of input channels,
    1                    # Number of output channels
)
```

where:

LWrapper	Name the created TDES_OBJECT , which is a pointer of a TDES_OBJECT type object
TWRAPPER	Type of TDES_OBJECT
'Wrapper1'	The reference name of the object in the simulation program
6,	the number of input channels to the object
1,	Number of output channels of the object

An object of type **TWRAPPER** has input and output channels because it is responsible for packing incoming Entities.

The input channel number is 6 in the previous sample example, but this parameter value can be any positive integer.

For the output channel number in the previous sample example, a value of 1 was specified, this parameter value is a constant value of one (1) due to the operation of the object.

3.4.6 TUNWRAPPER object

3.4.6.1 The task of the TUNWRAPPER object

- The **TUNWRAPPER** *DES* object is responsible for the wrapped Entity objects (*TDES_ENTITY*) unpackage into the simulation system model.
- The **TUNWRAPPER** object extracts the packed Entity (**Packed_Entity**) received at its input from the object (*i = 1..DESObject_Number_Of_OutputChannels*).
- On input with index 0 (zero) index arrives at the packed Entity (**Packed_Entity**).
- The wrapped Entity objects contain in the *Wrapper_Channel_Number_Of_Arrive* user attribute which output channel they leave the **TUNWRAPPER** object.
- The **Wrapped Entities** leave the **TUNWRAPPER** object first, and the package Entity (**Package_Entity**) last.

Operational notes:

=====

1. The **TUNWRAPPER** object can ONLY unpack Entities that are packaged with the **TWRAPPER** object!
2. If the Entity DOES NOT have a user attribute named *Wrapper_Channel_Number_Of_Arrive*, it leaves the **TUNWRAPPER** object in output channel 0!
3. If the incoming Entity (**Packed_Entity**) on input channel 0 does not contain any **Wrapped Entities**, it will leave the **TUNWRAPPER** object on output channel 0 without any unpacking operation.

!

3.4.6.2 Block diagram of the TUNWRAPPER object

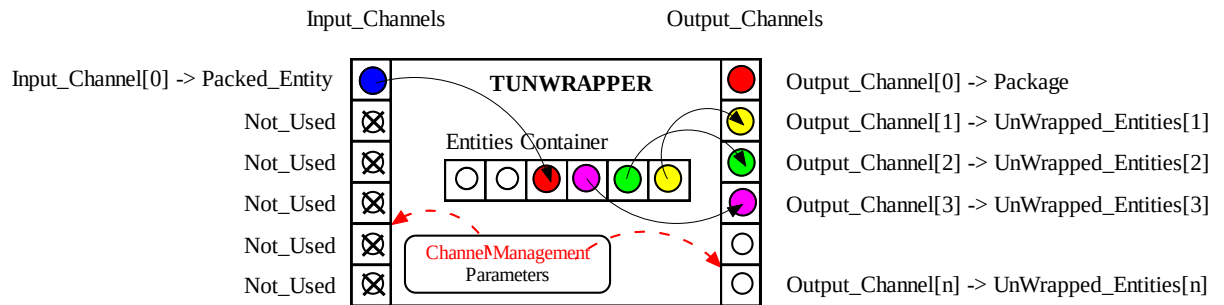


Figure 3.4.6.2.65 Block diagram of the TUNWRAPPER object

3.4.6.3 Defining the TUNWRAPPER Object

To create a DES object of type **TUNWRAPPER** in DES Python as follows:

```
LUnWrapper = TDES_OBJECT(
    TUNWRAPPER,          # Type of DES object,
    'UnWrapper1',        # Name the DES object,
    1,                   # Number of input channels,
    10                    # Number of output channels
)
```

where:

LUnWrapper	the name of the created TDES_OBJECT , which is a pointer to an object of type TDES_OBJECT ,
TUNWRAPPER	Type of TDES_OBJECT
'UnWrapper1'	The reference name of the object in the simulation program
1,	the number of input channels to the object
10,	Number of output channels of the object

The **TUNWRAPPER** object has input and output channels because it is responsible for unpacking incoming Entities.

For the input channel number, in the previous example, 1. This parameter must always be set to one (1) because **TUNWRAPPER** always unpacks only one **Packaged Entity**.

The output channel number is set to 10 in the previous sample example, but this parameter value can be any positive integer. If an incoming Entity to be unpacked requires less output (fewer types of parts contain an Entity), no unpacked Entity will appear in the remaining outputs.

3.4.7 TPATH Object

3.4.7.1 The task of the TPATH object

- The **TPATH** DES object is responsible to delay Entity (**TDES_ENTITY**) objects in the simulation system model using a **TMACHINE** object.
- An object is a model of a multi-lane highway in which multiple Entities can simultaneously move from one input to one output of the **TPATH** in adjacent lanes.
- The TPATH DES object consists of two basic DES objects: a **tpath_control** object with properties like the **TBUFFER** type and a **TMACHINE** DES object.
- The **tpath_control** object determines the amount of delay time from the geometric data of the path. The object's **PATH_Number_of_Tracks** attribute specifies how many lanes there will be on a multilane road. This integer value is also copied to the **DESObject_Capacity** attribute of the **TMACHINE** object. The delay time defined from geometry data is also copied into the **TMACHINE** object **MACHINE_ConstantValue_Of_Time** and **MACHINE_Mean_Of_Time** attributes. (Why only these because they are the ones we use most often!)
- The **TMACHINE** object is an object that performs a N_Machine delay in which the value of N is set by using the **DESObject_Capacity** attribute. With the specified delay duration, **TMACHINE.TDistribution_Exponential_Mean** you set a distribution; individual delay times are defined for all worker items.

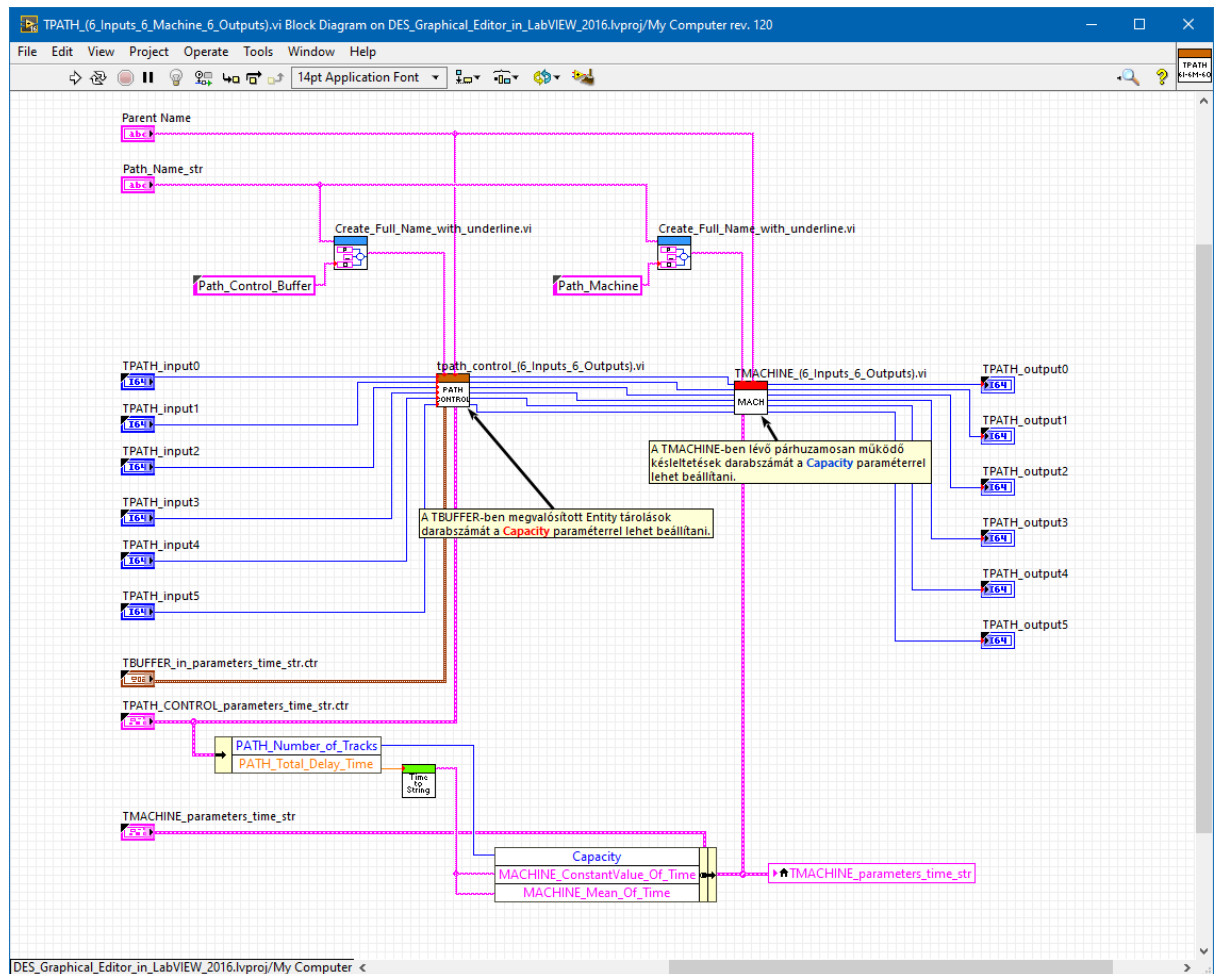


Figure 3.4.7.1.66 Block diagram panel of the TPATH object with single-wire inputs and outputs (6 inputs and 6 outputs) in the LabVIEW graphical editor

In DES Python you can create many connections for many DES objects, the manual programming of which can cause a lot of errors. Not to mention that defining repeated DES object and object joins that involve changing the topology of the DES model is again prone to error.

Setting the properties of many DES objects and checking them also requires concentrated attention and is sometimes a very tedious task. However, a lot depends on the exact network topology and setting the values of the properties. The computer always calculates the network that you have programmed. If the network topology is faulty, we run this faulty model!

To minimize these errors as much as possible, I created a graphical editing program in LabVIEW 2016 environment that allows.

- the structure of the DES model from the possible (described) DES object types.
- ensures that properties of DES objects are set using a menu system and time-format strings.
- duplicate DES model structures can be used to create a subroutine that can be called with arbitrary parameters in another part of the model even several times with several other parameters.
- easy to implement connections between DES objects and modify them.
- the graphical editing program checks the correctness of DES model connections and provides information about the repetition of the object name and the correctness of the connections.
- when all conditions are correct, it writes (creates) the DES Python program from the model defined by graphical icons, which is an implementation of the model in Python programming language. This program can be run directly in DES Python.

The **Figure 3.4.7.1.66** and the following illustrations were created in this graphics editing program. The sample examples were also created with this graphical editing program.

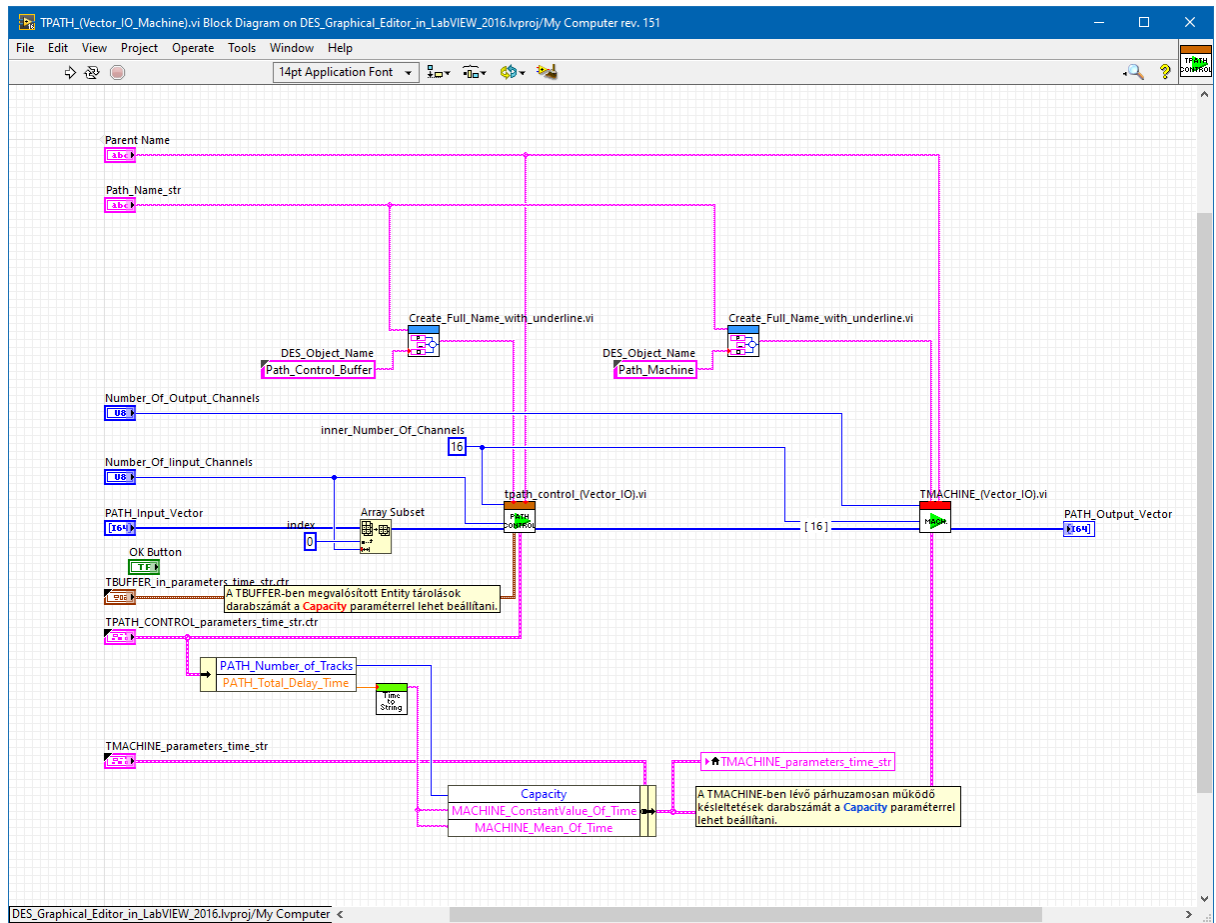


Figure 3.4.7.1.67 Diagram Panel of the TPATH object with vector inputs and outputs (any number of inputs and outputs) in the LabVIEW graphical editor

TPATH input parameters:

TPATH_CONTROL_parameters_time_str

PATH_Length [m] 100,000	PATH_Number_of_Tracks [] 6		
PATH_Acceleration [m/s**2] 1,000	PATH_Constant_Velocity [m/s] 1,000	PATH_Retardation [m/s**2] -1,000	PATH_Need_Parameter_Recalculation_bool NO
PATH_Total_Delay_Time [s] 100,000	PATH_Use_Only_Total_Delay_Time_bool NO		

Figure 3.4.7.1.68 Geometric parameters of the TPATH object

Input parameters for tpath / tbuffer:

TBUFFER_in_parameters_time_str.ctr

BUFFER_Type_Of_Queue TQueue_First_In_First_Out	InputChannel_Index 0	InputChannel_Index_Selection_Strategy TSelection_Random_Selected_Index
Capacity 10	OutputChannel_Index 0	OutputChannel_Index_Selection_Strategy TSelection_by_Tidle_State_Of_Connected_DESObject

Figure 3.4.7.1.69 Input parameters for the TBUFFER object portion of the TPATH object

Input parameters for tpath / tmachine:

TMACHINE_parameters_time_str

MACHINE_Distribution TDistribution_Constant_Value	MACHINE_ConstantValue_Of_Time 0:00:00:01.000	MACHINE_Maximum_Of_Time 0:00:00:03.000
Capacity 1	MACHINE_Mean_Of_Time 0:00:00:01.000	MACHINE_Usual_Of_Time 0:00:00:02.000
	MACHINE_Deviation_Of_Time 0:00:00:01.000 hour:minute:second.xxx	MACHINE_Minimum_Of_Time 0:00:00:01.000 hour:minute:second.xxx
InputChannel_Index_Selection_Strategy TSelection_Random_Selected_Index	OutputChannel_Index_Selection_Strategy TSelection_Random_Selected_Index	
InputChannel_Index 0	OutputChannel_Index 0	

Figure 3.4.7.1.70 Input parameters for the TMACHINE object portion of the TPATH object

- After the **TPATH** object is created, it is placed in a Python list object and referenced in the simulation program by the name of the DES object ('Path1'), its ID_Number value, or its index in DESObjectList.

- The **TPATH** object delays the further progress of Entity objects received at its input.
 - The **DESObject_Capacity** parameter in the **TBUFFER** portion of the **TPATH** object specifies the maximum number of **TDES_ENTITY** objects that can be stored (on hold) in the object.
 - The **DESObject_Capacity** parameter in the **TMACHINE** portion of the **TPATH** object specifies the maximum number of **TDES_ENTITY** objects that are delayed in parallel in the object.

3.4.7.2 Block diagram of the TPATH object

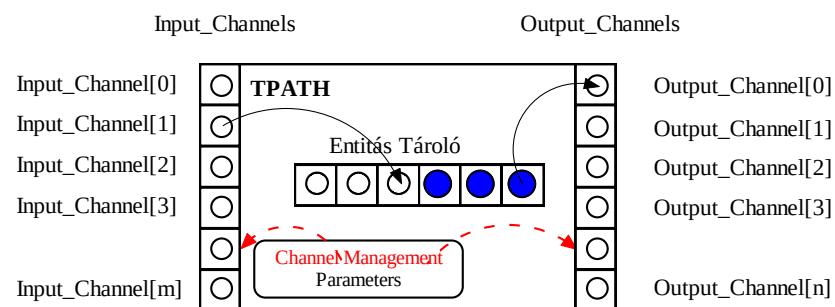


Figure 3.4.7.2.71 Block diagram of the TPATH object

3.4.7.3 Defining the TPATH Object

To create a DES object of type **TPATH** in DES Python as follows:

```
LPath = TDES_OBJECT(
    TPATH,          # Type of DES object,
    'Path1',        # Name the DES object,
    11,             # Number of input channels,
    14              # Number of output channels
)
```

where:

LPath	Name the created TDES_OBJECT , which is a pointer of a TDES_OBJECT type object
TPATH	Type of TDES_OBJECT
'Path1'	The reference name of the object in the simulation program
11,	the number of input channels to the object
14,	Number of output channels of the object

The **TPATH** object *has input and output channels* because its job is to delay the progress of incoming Entities.

The *input channel number is set to 11 in the previous sample example, but this parameter value can be any positive integer.*

The *output channel number is set to 14 in the previous sample example, but this parameter value can be any positive integer.*

3.4.8 TLOCK object

3.4.8.1 The task of the TLOCK object

- The **TLOCK** DES object is responsible for limit the number of Entity (**TDES ENTITY**) objects in the specified part (segment) of the simulation system model.
 - The **TLOCK** object uses its **LOCK_Time_Step** parameter to delay the progress of the Entity object received at its input in the simulation system by a specified amount of time. (**LOCK_Time_Step** = 0.0 is the currently set value!)
 - For each Entity entering input channel 0, the object is **self.LOCK_Actual_Number_of_Entities_in_Segment** attribute value is incremented by one.
 - The input channel 0 (zero) of the **TLOCK** object is called **the data input channel**. The **data output channel** is the 0th (zeroth) output channel of the TLOCK object.
 - Output channel 1 of the **TLOCK** object must be linked to the Entity bouncer object exiting the segment, which is an **TUNLOCK** object (**information channel**).
 - If the **self.LOCK_Actual_Number_of_Entities_in_Segment** value equals or exceeds the **self.LOCK_Entity_Number_Limit_in_Segment** attribute value, it closes input channel 0 of the object from further Entity traffic and does not allow any more Entities to pass.
 - Input channel 0 is opened when an Entity passes through the **TUNLOCK** object connected to output channel 1 of the **TLOCK** object, that is, exits the managed part (model segment).
 - The **self.LOCK_Maximum_Number_of_Entities_in_Segment** attribute specifies the maximum number of Entities in the segment during the simulation.

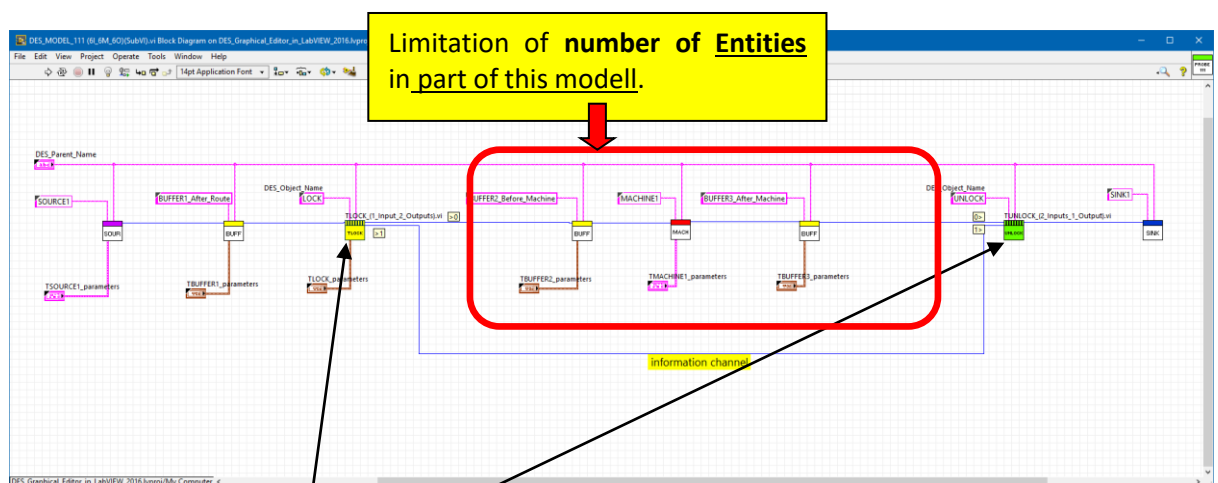


Figure 3.4.8.1.72 Diagram Panel of sample example of TLOCK – TUNLOCK objects

3.4.8.2 Block diagram of the TLOCK object

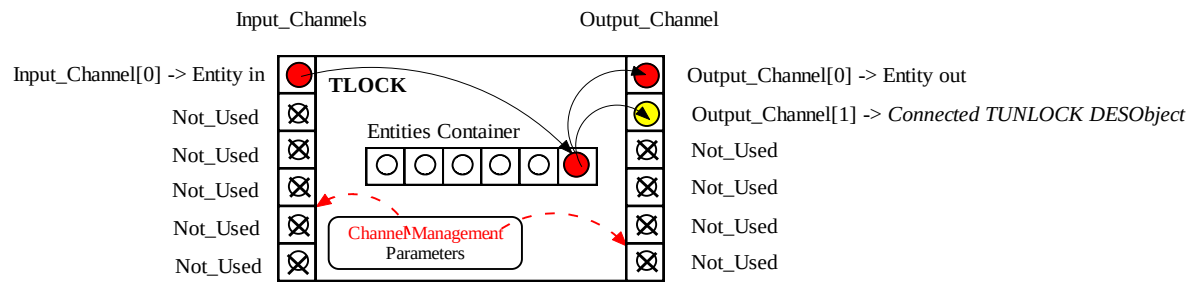


Figure 3.4.8.2.73 Block diagram of the TLOCK object (24-25)

3.4.8.3 Defining the TLOCK Object

To create a DES object of type **TLOCK** in DES Python as follows:

```
LLock = TDES_OBJECT(
    TLOCK,          # Type of DES object,
    'Lock1',        # Name the DES object,
    1,              # Number of input channels,
    2               # Number of output channels
)
```

where:

LLock	Name the created TDES_OBJECT , which is a pointer of a TDES_OBJECT type object
TLOCK	Type of TDES_OBJECT
'Lock1'	The reference name of the object in the simulation program
1,	the number of input channels to the object
2,	Number of output channels of the object

A **TLOCK** object has input and output channels because its job is to limit the number of incoming entities in each simulation segment.

For the input channel number, a value of 1 in the sample example is a condition for the correct operation of the object.

For the output channel number in the sample example, a value of 2 is a condition for the correct operation of the object.

3.4.9 TUNLOCK object

3.4.9.1 The task of the TUNLOCK object

- The **TUNLOCK** After creating a DES object, it is placed in a Python object list, and then in the simulation program with the name of the DES object ('UnLock1'), ID_Number value or its index in DESObjectList.
- The **TUNLOCK** object implements the verification of the further progress of Entity objects received at its input,
 - The **TUNLOCK** object is `self.UNLOCK_Time_Step` uses its attribute to delay the progress of the entity object received at its input in the simulation system by a specified amount of time. (`UNLOCK_Time_Step = 0.0` set value!)
 - Input channel 0 of the **TUNLOCK** object is the **data input channel**.
 - Input channel 1 of the **TUNLOCK** object is the validation channel that connects to the peer **TLOCK** object's output channel 1. The purpose of this connection is for the **TUNLOCK** object to be able to access the attributes of the **TLOCK** object attached to it. (**information channel**)
 - For each Entity that enters the **TUNLOCK** object on input channel 0, it reduces the value of the **TLOCK** object `LOCK_Actual_Number_of_Entities_in_Segment` attribute associated with it on input channel 1 by one(1).
- An object of type **TUNLOCK** has input and output channels because its job is to verify that Entities are progressing.
 - The value of the input channel number is 2, which is a condition for the correct operation of the object.
 - The output channel number is set to 1, which is a condition for the correct operation of the object.

2.4.9.2 Block diagram of the TUNLOCK object

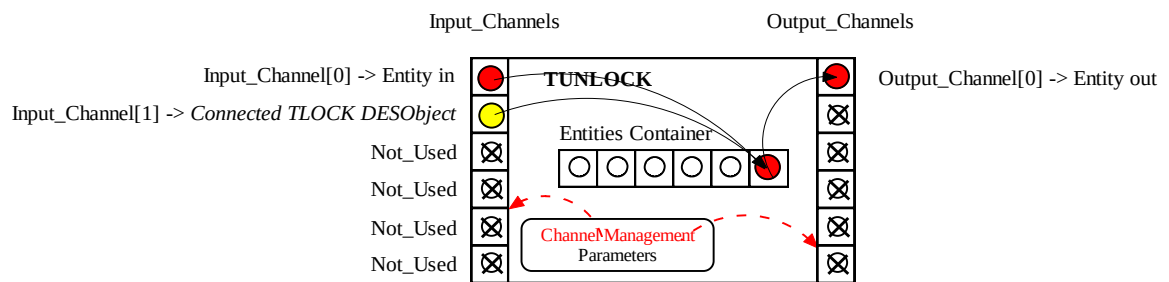


Figure 3.4.9.2.74 Operational block diagram of the TUNLOCK object

3.4.9.3 Defining the TUNLOCK Object

To create a DES object of type **TUNLOCK** in DES Python as follows:

```
LUnLock = TDES_OBJECT(
    TUNLOCK,          # Type of DES object,
    'UnLock1',        # Name the DES object,
    2,                # Number of input channels,
    1                  # Number of output channels
)
```

where:

LUnLock	Name the created TDES_OBJECT , which is a pointer of TDES_OBJECT type of object,
TUNLOCK	Type of TDES_OBJECT
'UnLock1'	The reference name of the object in the simulation program
2,	the number of input channels to the object
1,	Number of output channels of the object

3.5 TDES_TASK object

3.5.1 The task of the TDES_TASK object

- **TDES_TASK** object in the DES Python simulation system the *Task object*.
- The **TDES_TASK** object can be sent by any DES object in a simulation system. A DES object can submit a job to another DES object or to itself. In most cases, their DES object sends itself a task command (later) to solve its own timing tasks.
- The **TDES_TASK** object is placed in a task list that stores tasks sorted in ascending order by execution time. We always execute the current task (with the lowest execution time) in the next simulation step.
- Therefore, the most important parameters of the task object are to specify when and what type of task which object should perform during the simulation!
- In the DES Python simulator, only DES objects currently send task execution commands!

3.5.2 Block diagram of TDES_TASK object

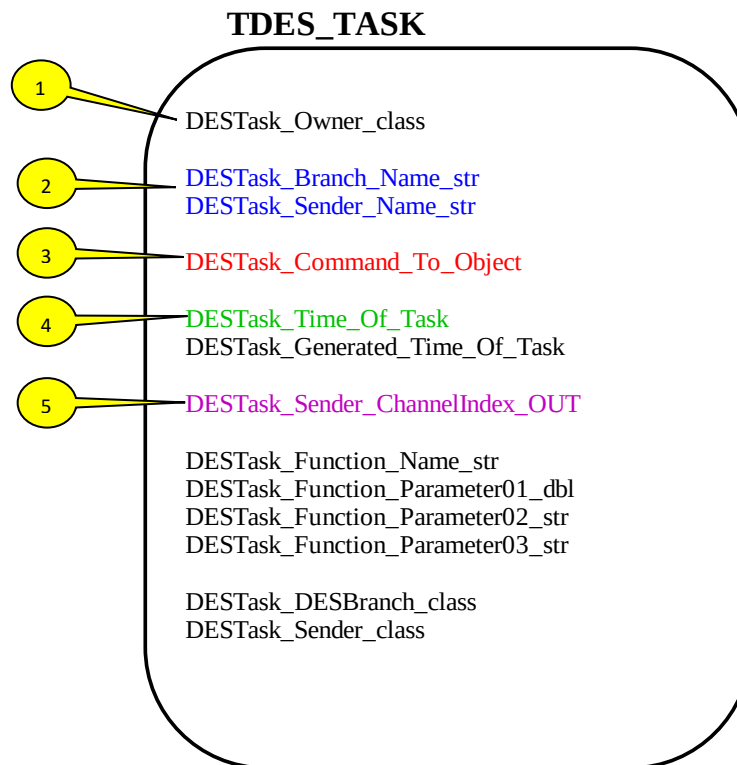


Figure 3.5.2.75 Attributes of the TDES_TASK object

1. The owner object (**DESTask_Owner_class**) of the **TDES_TASK** is a **TDES_BRANCH** object where it is placed in the **DESBranch_DESTaskList** vector of the branch.
2. The DES object is identified by the branch (**DESBranch_Name_str**) and DES object (**DESObject_Name_str**) names. With these two parameters, similarly to family names, we can specify by which last name (**DESBranch_Name_str**) and by what first name (**DESObject_Name_str**) we can identify the DES objects.
The **DESObject_Name_str** is called *a unique name*, which is a name that can occur only once in the simulation branch (**TDES_BRANCH**).
3. In DES Python, the next tasks are currently implemented using the **DESTask_Command_To_Object** attribute:

TDESObject_Next_State

- Examine the Input Channels of Entities. If there is an Entity at the input channels, it reads them.
- Updates the state of the DES object. Executes the operating algorithm of the DES object.
- Populates the Output Channel with the emitted Entity.
- Invitation of the *TDES OBJECT its own procedures*, which are:
 - **DESBranch_ON_AFTER_ENTITY_ENTERED_into_InputChannel_of_DESObject**

Executes when the Entity enters the input channel of DES object.

- **DESBranch_ON_AFTER_ENTITY_ENTERED_into_DESObjectamelyet** is Executed when the Entity enters the DES object.
- **DESBranch_ON_BEFORE_ENTITY_EXITED_from_DESObject**
That is executed when the Entity has just exited the DES object.
- **DESBranch_ON_AFTER_ENTITY_ENTERED_into_OutputChannel_of_DESObject**
Is executed when the Entity is logged into the DES object output channel.

TENTITY_Move_Request

- Carries the Entity from the output channel of one DES object to input channel of another DES object.

TPROCESS_Calculating

- The DES object allows you to invoke its own procedures. These stand-alone procedures can be created by the user. Currently, the operation of the CSS simulator related to the DES simulator works with this program extension option. CSS = Continuous System Simulator

TSTOP_Executing

- End (stop) the simulation program.

4. Time of command execution (**DESTask_Time_Of_Task**) when the task is to be executed. The tasks list can include multiple tasks that have the same execution time. Another task that has the same time as an earlier task in the list is always added to the task list after tasks that have the same time.
5. The output channel index (**DESTask_Sender_ChannelIndex_OUT**) of the DES object sending the command, which can be used to determine from which output channel the Entity should be moved (if possible) to the input channel of another DES object for the **TENTITY_Move_Request** command. The location of the transfer is indicated in the index object of the output channel.

3.5.3 Defining the TDES_TASK Object

To create an object of type **TDES_TASK** in DES Python, do the following:

```
LTask = TDES_TASK()
```

The following Python program snippet shows how to populate the created **TDES_TASK** object with the current attributes and submit it to the list of tasks.

The program snippet is included in one of the methods of the **TDES_BRANCH** object, so the **self**-attribute is an address pointing to this branch object (the object's base pointer).

```

LTask = TDES_TASK()
#-----
-----
LTask.DESTask_Command_To_Object.Set_Item_str_to('TDESOBJECT_Next_State')
LTask.DESTask_Generated_Time_Of_Task = self.
DESBranch_Simulationtime_Now

LTask.DESTask_Branch_class = self
LTask.DESTask_Branch_Name_str = self. DESBranch_Name_str

LTask.DESTask_Sender_class = LBuffer
LTask.DESTask_Sender_Name_str = LBuffer.DESObject_Name_str

LTask.DESTask_Time_Of_Task = self. DESBranch_Simulationtime_Now
LTask.DESTask_Sender_ChannelIndex_OUT = DES_GNot_Known_Channel_Number
LTask.DESTask_Function_Number_Of_Process= 0

self.DESBranch_Insert_DES_TASK_Into_DESTaskList_As_LAST(LTask)

```


3.6 TDES_ENTITY object

3.6.1 The task of the TDES_ENTITY object

- *The **TDES_ENTITY** a DES object in a DES Python simulation system is a DES object that represents properties (material or informational) in the model, which is a simulation system with **TDES_OBJECT**- implements the operation of the DES model.*
- The owner object of the **TDES_ENTITY** object is the **TDES_ENTITYLIST**, which means that without the **TDES_ENTITYLIST** this object cannot function. The **TDES_ENTITYLIST** is an object independent of **TDES_BRANCH**!
 - The **TDES_ENTITYLIST** as a container object that contains the Entities created in the simulation system. From **TDES_ENTITYLIST**, it is possible to retrieve Entities currently in the simulation model based on Entity name, ID_Number value, or index.
 - In the simulation model, active Entities are defined by


```
ENTITYLIST = TDES_ENTITYLIST('ENTITYLIST')
```

 object.
 - Entities that have left the simulation system (previously were active) are represented by clicking


```
SINKED_ENTITYLIST = TDES_ENTITYLIST('SINKED_ENTITYLIST')
```

 object.
- The name of the **TDES_ENTITY** object (**DESEntity_Name_str**) used by the simulation system to identify Entities and the name that can be given by the user and closely related to the operation of a specific system (**DESEntity_Caption_str**).

3.6.2 Block diagram of TDES_ENTITY object

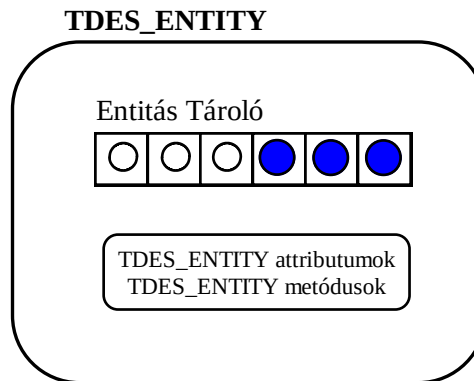


Figure 3.6.2.76 Block diagram of the TDES_ENTITY object

The **Figure 3.6.2.76** shows that each Entity has an Entity Container in which we can store other Entities. The Entity container has a bar **DESEntity_Capacity** attribute, but we have set an extremely high value for this ($9.9e+12$), and the program does not check if this value is exceeded.



Figure 3.6.2.77 The TDES_ENTITY object with empty Entity Container

When defining an Entity, the Entity Container (**DESEntity_Content_Entities_Vector**) is empty and Entities are added while the simulation model is running. (Only Entities can be included!)



Figure 3.6.2.78 The TDES_ENTITY object is Entity container, with Entities

If the operation of the Entity in the model requires placing Entities in the Entity Container after definition (which starts with an empty Entity Container), this can be accomplished using a simple for loop.

The following Python snippet demonstrates this:

```
LContainer_Entity = TDES_ENTITY(
    DESObject_Name_str, # string _Name_Of_Parent_DES_Object_str,
    LContainer_EntityName_str, # string _Name_Of_Entity_str,
)
LContainer_Entity.DESEntity_Owner_class = ENTITYLIST

for i in 3:
    LEntity = TDES_ENTITY(
        LContainer_EntityName_str, # string
        _Name_Of_Parent_DES_Object_str,
        LEntityName_str, # string _Name_Of_Entity_str,
    )

    LContainer_Entity.DESEntity_Content_Entities_Vector.append(LEntity)
```

3.6.3 Defining the TDES_ENTITY Object

To create an object of type **TDES_ENTITY** in DES Python in the following way:

```
LEntity1 = TDES_ENTITY('Source1', 'Apple')
```

in this case, we provide the name of the **TDES_OBJECT** containing the Entity and the name of the Entity (**TDES_ENTITY**).

or alternatively, if we cannot or cannot specify them, then the Entity is defined as follows:

```
LEntity2 = TDES_ENTITY()
```

3.7 TDES_ENTITYLIST object

3.7.1 The task of the TDES_ENTITYLIST object

The **TDES_ENTITYLIST** DES object in DES Python simulation system **TDES_ENTITY** objects provide storage.

The owner object of the **TDES_ENTITYLIST** object is **None**, that is, this object does not have an owner object.

- From **TDES_ENTITYLIST**, it is possible to retrieve Entities in or out of the simulation model based on the name, value or index of the Entity, ID_Number.
 - Active entities in the simulation model are defined by


```
ENTITYLIST = TDES_ENTITYLIST('ENTITYLIST')
```

 object.
 - Entities that have already left the simulation system (previously were active) are represented by


```
SINKED_ENTITYLIST = TDES_ENTITYLIST('SINKED_ENTITYLIST')
```

 object.
- The name of the **TDES_ENTITYLIST** object (**DESEntityList_Name_str**) used by the simulation system to identify **TDES_ENTITYLIST**, and the name (**DESEntityList_Caption_str**) that can be given by the user.

3.7.2 Block diagram of TDES_ENTITYLIST object

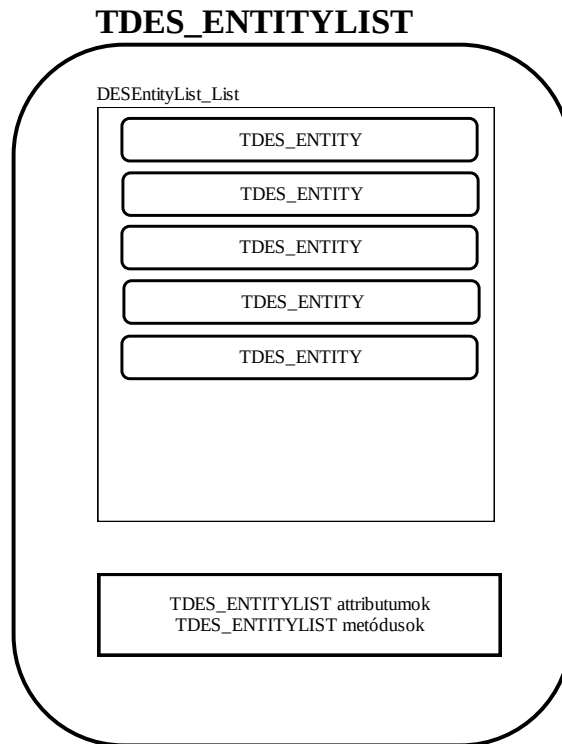


Figure 3.7.2.79 Block diagram of the TDES_ENTITYLIST object

3.7.3 Defining the TDES_ENTITYLIST Object

To create an object of type **TDES_ENTITYLIST** in DES Python in the following way:

```
LEntityList1 = TDES_ENTITYLIST('ENTITYLIST')
```

3.8 TDES_BRANCHLIST object

3.8.1 The task of the TDES_BRANCHLIST object

- The **TDES_BRANCHLIST** DES object in the DES Python simulation system contains objects (**TDES_BRANCH**) is included.
- The **TDES_BRANCHLIST** object contains the following main elements:
 - storage vector of **TDES_BRANCH**-es, (**DESBranchList_BranchList**)
 - storage vector of current **TDES_TASK** for each **TDES_BRANCH**, (**DESBranchList_TaskList**)
- The **TDES_BRANCHLIST** object does not have an owner object, so this value is None. In the DES Python simulation model, this object is at the top level of the hierarchy.
- The name of the **TDES_BRANCHLIST** object is **DESBranchList_Name_str**, which is used by the simulation system to identify the **TDES_BRANCHLIST**, and the name that can be given by the user and closely related to the operation of a specific system is **DESBranchList_Caption_str**.

3.8.2 Block diagram of TDES_BRANCHLIST object

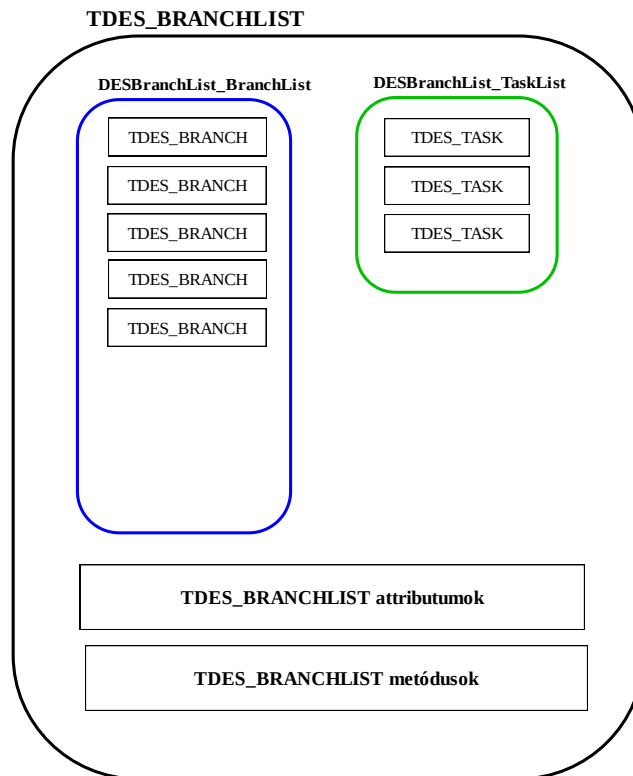


Figure 3.8.2.80 Block diagram of the TDES_BRANCHLIST object

3.8.3 Defining the TDES_BRANCHLIST Object

To create an object of type **TDES_BRANCHLIST** in DES Python in the following way:

```
LBranchList1 = TDES_BRANCHLIST()
```

where:

LBranchList1 The TDES_BRANCHLIST object

4. Programming of Discrete Event Simulator (DES)

In the Python DES simulation system, programming involves creating objects, setting their attributes, and calling their methods.

For a Python program of a DES Python simulation model

- We need to define the **TDES_OBJECT** objects in the model and set the attribute values with which we want to run the simulation model.
- define the relationships in the model (**TDES_CONNECTION**) which are different **TDES_OBJECT**, .

The following sections of this article describe in detail how to set the minimum required attributes for different types of **TDES_OBJECT**.

Of course, other attributes of **TDES_OBJECT** can be set when defining the object, but setting the value of these attributes is necessary for it to work.

In the DES Python simulation model, *smallest unit of time is the simulation second*. This does not mean that there cannot be a time value of less than 1 simulation second in the simulation, but the timing is based on seconds.

To set the times accurately, we use various Python functions, which always give simulation seconds as a result.

Such functions include:

- seconds (seconds_float)
- minutes (minutes_float),
- hours (hours_float),
- days(days_float),

Each converts the xxx_float true value to the second dimension according to the unit of time specified by the procedure name.

In the following sample example

```
Branch.DESBranch_Simulationtime_End = hours(0.5) + minutes(2.0) +
seconds(12.34)
```

This value is 0.5 hours = 1800 seconds, 2 minutes = 120 seconds for a total of 1920 + 12.34 = 1932.34 seconds.

The durations are also converted from second dimension today, hour, minute, second by a function (**DES_Seconds_to_Days_Hours_Minutes_Seconds_str**) and accordingly we get the DES Python is a general time specification format that is as follows:

DAY: HOUR: MIN: SEC.000

where:

DAY	number of days,
HOUR	the number of hours,
MIN	number of minutes,
SEC.000	is the value of seconds.

Based on this, the duration in the above sample example will be as follows: 000d:00h:32m:12.340s

4.1 Programming TDES_OBJECT types

In the detailed block diagram of the **TDES_OBJECT**, we have plotted the most important properties and methods of the DES object.

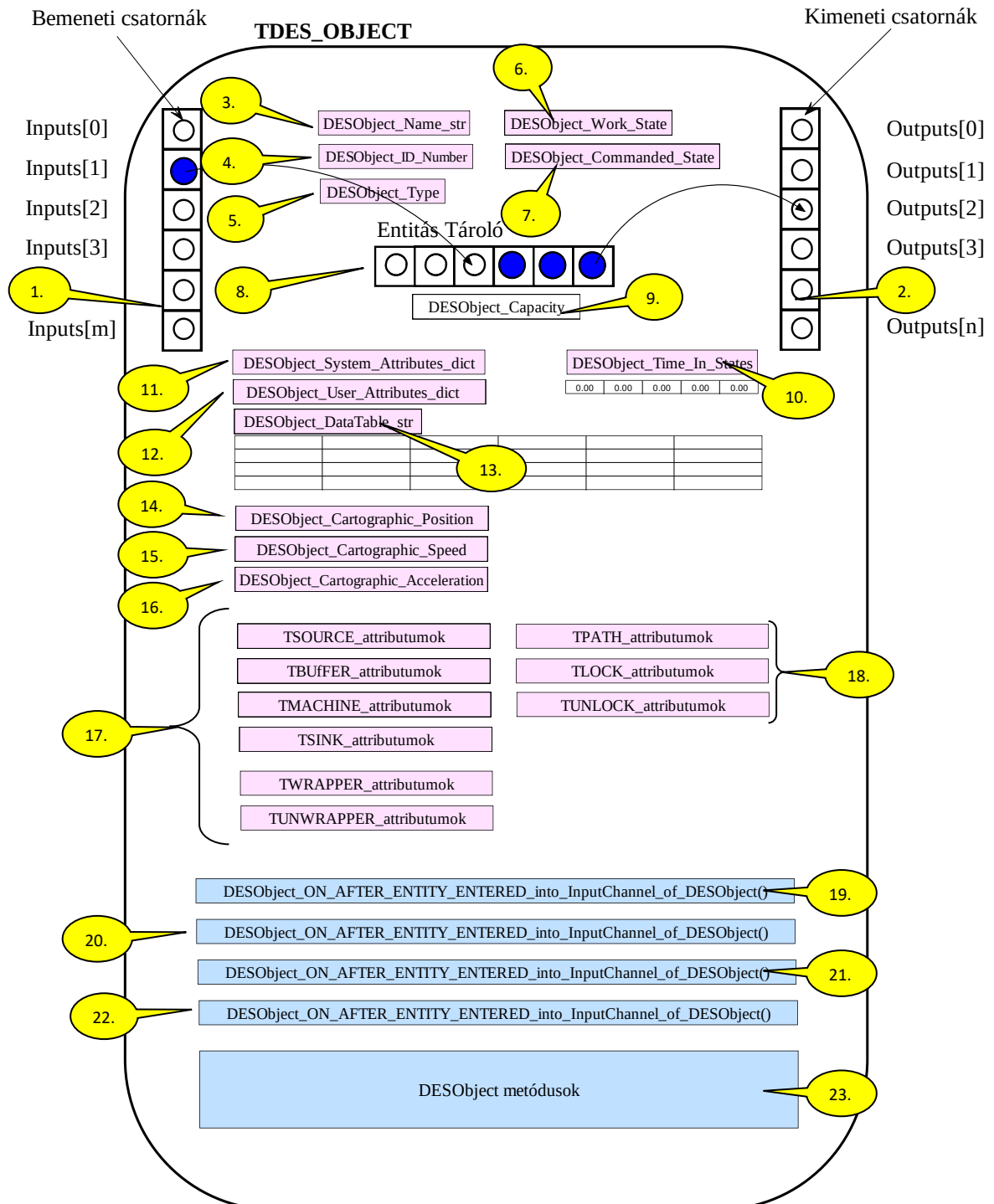


Figure 4.1.81 Detailed block diagram of the TDES_OBJECT object

1. Vector of input channels

The vector of the input channels contains **TDES_CHANNEL** objects. The number of elements in the vector is equal to the number of inputs to the DES object (**self.DESObject.NumberOfInputChannels**).

The **TSOURCE** object has no input channels by default.

Data entry from the vector of the input channels for **TBUFFER**, **TSINK** objects is done by reading the Entities currently present in all input channels *to update the state variables of the object*.

The input channels for **TWRAPPER** and **TUNERAPPER** objects are selected using instructions defined by the sequential state machine. These object types do not apply the input channel selection strategy.

Among the objects, for the operation of the update procedure of the **TMACHINE**, **TPATH**, **TLOCK**, **TUNLOCK** object, it is necessary to read only one element from the vector of the input channels. The selection of this element implies the definition of the index of the channel. The definition of the input channel index is implemented by a method that contains the following index selection strategies (TDES_Channel_Index_Selection_Strategy_tuple).

TDES_Channel_Index_Selection_Strategy_tuple = (

```
'TSelection_Constant_Index',          #=0  (I/O)
```

Allows you to set a constant input channel index. The value of the channel index to be set is set to `self.DESObject_Setted_InputChannel_Index` object property. From this object property, the input channel index is Set.

```
'TSelection Random Selected Index',          #=1  (I/O)
```

Allows you to set an evenly distributed random input channel index. The selection method considers how many pieces of connected input channel to the object. The connection of input channels can be arbitrarily distributed (continuous or connection containing input channel skips). The evenly distributed Random channel index selection from active channels only happen.

'TSelection Cyclical Selected Index', #=2 (I/O) Round Robin type selection

The selection strategy method determines the active inputs of the object and selects from them by moving through the indexes of the active inputs. Each time an object is updated, it increments the index value of the current input channel by one. When the largest possible input channel reaches an index, increment causes you to return to the first possible input index.

```
'TSelection First Available Index Start From First Index',    #=3    (I/O)
```

The selection strategy method determines the active inputs of the object and selects the first active input index that contains an Entity. Starting from the smallest active index, it increments the index to find a possible selected index.

```
'TSelection First Available Index Start From Last Index From Back',      #=4    (I/O)
```

The selection strategy method determines the active inputs of the object and selects the first active input index from the index, which contains an Entity starting from the largest active index.

Starting from the largest active index, it searches for possible by decreasing the index selected index.

'TSelection_By_DESObject_User_Attribute', #=5 (I/O)

The selection strategy sets the object's user properties (attributes) around the **Selected_InputChannel_Index**, a numeric value converted from a string stored in the property.

'TSelection_By_Channel_Ratio_Values', #=6 (I/O)

For valid channels (with connections), a positive real-world value (double) is assigned a ratio that is **Channel.DESChannel_Selection_Ratio_Value** user property.

From the ratios (for each invocation) we determine the channel percentage equivalent selection rate. Select the input channel index for the channels percentage of participation based on an evenly distributed random number is carried out using a generator.

Zero (0) means that the channel will never be placed selected.

The ratios can be arbitrary POSITIVE REAL VALUES, their sum will be the sum of the 100% and the percentage of channel selection is determined by program.

The POSITIVE value of the ratio is examined by the procedure and stopped if the ratios any negative value or the sum of the ratios for valid channels zero (0.0) value!

'TSelection_by_External_Selected_Index', #=7 (I/O)

The input channel index determination procedure is an external user-written Python this. (This channel selection method has not yet been fully developed.)

2. Vector of output channels

The vector of the output channels contains **TDES_CHANNEL** objects. The number of elements in the vector is equal to the number of inputs to the DES object (**self.DESObject_Number_Of_OutputChannels**).

The **TSINK** object has no output channels due to its operation.

Output channels are selected for **TWRAPPER** and **TUNERAPPER** objects using indexing instructions defined by the sequential state machine. These object types do not apply the output channel selection strategy.

The output channel index selection strategies for DES objects allow you to place a piece of Entity in a selected channel.

This strategy is used to place entities in output channels with objects of type **TSOURCE, TBUFFER, TMACHINE, TPATH, TLOCK, TUNLOCK.**

The output channel index definition is implemented by a method that includes the following index selection strategies:

'TSelection_Constant_Index', **#=0 (I/O)**

Allows you to set a constant input channel index. The value of the channel index to be set is **self.DESObject_Setted_InputChannel_Index** must be placed in the object property. From this object property, the input channel index is set.

'TSelection_Random_Selected_Index', **#=1 (I/O)**

Allows you to set an evenly distributed random input channel index. The selection method considers how many connected inputs channel to the object.

The connection of input channels can be arbitrarily distributed (continuous or connection containing input channel skips). The evenly distributed Random channel index selection from active channels only happen.

'TSelection_Cyclical_Selected_Index', **#=2 (I/O) Round Robin type selection**

The selection strategy method determines the active inputs of the object and selects from them by moving through the indexes of the active inputs. Each time an object is updated, it increments the index value of the current input channel by one. When the largest possible input channel reaches an index, incrementing moves it back to the first possible input index.

'TSelection_First_Available_Index_Start_From_First_Index', **#=3 (I/O)**

The selection strategy method determines the active inputs of the object and selects the first active input index that contains an Entity. Starting from the smallest active index, it increments the index to find a possible selected index.

'TSelection_First_Available_Index_Start_From_Last_Index_From_Back', **#=4 (I/O)**

The selection strategy method determines the active inputs of the object and selects the first active input index from those indexes, which contains an Entity starting from the largest active index.

Starting from the largest active index, it searches for possible by decreasing the index selected index.

'TSelection_By_DESObject_User_Attribute', **#=5 (I/O)**

The selection strategy sets the object's user properties (attributes) around the **Selected_InputChannel_Index** string stored with a property called converted to a numeric value.

'TSelection_By_Channel_Ratio_Values', **#=6 (I/O)**

For valid channels (with connections), a positive real-world value (double) is assigned a ratio that is **Channel.DESChannel_Selection_Ratio_Value** user property.

From the ratios (for each invocation) we determine the channel percentage selection rate. Select the input channel index for the channels percentage of participation based on an evenly distributed random number is carried out using a generator.

Zero (0) means that the channel will never be placed Selected.

The ratios can be arbitrary POSITIVE REAL VALUES, their sum will be the sum of the 100% and the percentage of channel selection is determined by program.

The POSITIVE value of the ratio is examined by the procedure and stopped if the ratios any negative value or the sum of the ratios for valid channels zero (0.0) value!

'TSelection_by_External_Selected_Index', #=7 (I/O)

The input channel index determination procedure is an external one by the user written Python procedure. This channel selection method isn't all there yet elaborated in detail.

'TSelection_by_Tidle_State_Of_Connected_DESObject', #=8 (only at Output)

The output channel index determination procedure for this strategy examines, that given *DES object associated with an output channel* **Tidle** *whether you are in a working state.*

- If so, the Entity is sent to this output channel.
- If not, try the next output channel index value as long as possible. If it finds a related DES object in **Tidle** working state at higher index values, it sends the Entity there.
- If no output channel is found that meets the above requirements, you exit the procedure with channel selection failure information. This means that it does not issue a valid output channel index! (Outputs -1 as channel index value!)

The number of output channels for the **TPATH** DES object type is the number of tracks in the path:

self.PATH_Number_of_Tracks

for other DES object types:

self. DESObject_Number_Of_OutputChannels.

'TSelection_by_DESEntity_Priority_Value', #=9 (only at Output of TBUFFER)

Selects the Entities priority value in the Entity container of the DES object based on the Entities priority value maximum priority Entity and **DESObjektum_Content_Vector** 0. to make this Entity the next output Entity object.

DE related to DES object in the list of S objects, look for a related object whose **Tidle** your working condition. This free state sends the Entity to the index of the output channel.

'TSelection_by_DESEntity_Given_Name_str', #=10 (only at Output)

Output channel index selection strategy based on the original name of the entity. That Entity original name, not included in the name **ID_Number** Completion (**DESEntity_Given_Name_str**).

Passing through the output channel indices of the DES object with a for loop We will see if the **self.DESObject_Outputs[channel_index].**

DESChannel_Entity_Given_Name_to_Selection_str

one more is it the **DESEntity_out.DESEntity_Given_Name_str** –away.

If yes, then the for-loop channel_index value as output channel index chooses, otherwise, the output channel index should be 0 (zero) and this channel index to send the Entity object.

3. Name the object

- The object is named a string of data.
- Name characters must be visible characters (not so-called control characters like CR, LF, TAB, etc.)
- There is no limit on the number of characters in the name.

4. The ID_Number value of the object

- An object is an integer unique identifier, each object in the simulation model has a unique identification number.
- The ID_Number cannot take a value of zero (0).

5. Type of object

The types of objects that can be set are contained in the following typed constant.

```
TDES_Type_Of_DESObject_tuple = (
    TEMPTY,           #=0
    TENTITY,          #=1
    TSOURCE,          #=2
    TBUFFER,          #=3
    TMACHINE,         #=4
    TSINK,            #=5
    TWRAPPER,         #=6
    TUNWRAPPER,       #=7
    TPATH,            #=8
    TLOCK,            #=9
    TUNLOCK,          #=10
)
```

6. Working states of the object

The working states of the object are contained in the following typed constant:

```
TDES_Work_State_tuple = (
    TIdle,            #=0           # The object is waiting, able to work, but has no task.
    TBusy,            #=1           # The object is working on the Entity object it contains.
    TBlocked,         #=2           # The DES object has completed its own task, but cannot start
                                   # another task because the Entity in it is not could remove (pass on).
    TFailed,          #=3           # The object cannot work because disabled.
    TPaused           #=4           # The object is workable, but does not perform work and waits,
                                   # so that you can later replace a failed object (warm stand-up
                                   # mode).
)
```


7. Commanded states of the object

The commanded states of the object are contained in the following typed constant:

```
TDES_Commanded_State_tuple = (
    TCommanded_Enabled_State,    #=0
    TCommanded_Failed_State,     #=1
    TCommanded_Paused_State      #=2
)
```

If the commanded state of the DES object is **TCommanded_Enabled_State**, you can add **TIdle**, **TBusy**, and **TBlocked** working states from the working states of the object and it can perform all **Entity Move** operations, which are:

- Move an entity from the object's input channels to the DES object's Entity Store,
- Moves an entity from the DES object's Entity container to the output channels.

If the object's commanded status is **TCommanded_Failed_State**, then the object's working state will be **TFailed**. This means that:

- cannot read the Entity in its input feed into the DES object (Entity Container),
- the state of the DES object is not updated based on the Entity in the DES object,
- the DES object does not move the Entity in it (Entity Container) to output channels.

If the object's commanded status is **TCommanded_Paused_State**, then the object's working state will be **TPaused**. This means that:

- cannot read the Entity in its input feed into the DES object (Entity Container),
- the state of the DES object is not updated based on the Entity in the DES object,
- the DES object does not move the Entity in it (Entity Container) to output channels.

8. The object's Entity container

- The vector of the **internal Entity Store** of the DES object.
- The vector contains **TDES_ENTITY** objects.

9. Capacity of the object

The maximum number of items in the object's internal Entity Storage vector.

For the **TBUFFER** object, this value determines the maximum number of entities that can be stored in the container.

For **TSOURCE** and **TMACHINE** objects, a capacity value greater than one (1) means that their DES object can perform special operations.

- If the DES object of type **TSOURCE** and $1 < \text{self.DESObject\_Capacity}$ and integers, then the DES object of type **TSOURCE** emits as many Entities at the Entity issuance date as the capacity (**self.DESObject_Capacity**). If the **TSOURCE** DES object has not run out of Entities by the next Entity issuance date, it creates only enough Entities for the **TSOURCE** DES object to be **self.DESObject_Content_Entities_Vector** count of Entities plus count of newly created Entities is the sum of capacity (**self.DESObject_Capacity**). You create only enough Entities so that there is always a capacity count of Entities in the DES object at the time the Entities are issued.

- DES object capacity of type **TMACHINE** (`self.DESObject_Capacity`), which must be a minimum positive integer of 1 or greater, specifies how many **TMACHINE** objects operate in parallel.

10. Simulation periods spent in working states

A vector of time spent in the working states of the object. The vector elementary is updated at the end of the execution of the object's **TDESOBJECT_Next_State** command.

```
TDES_Status_Time_Parameters = [
    0.0, # Idle,      #=0
    0.0, # Busy,     #=1
    0.0, # Blocked,  #=2
    0.0, # Failed,   #=3
    0.0, # Paused,   #=4
]
```

11. Object system properties

A DES object is a vector containing system properties. An object is a directory structure that contains **TDES_OBJECT_SYSTEM_ATTRIBUTE** elements of a data structure.

This property stores data of type string that can be identified by name.

This vector is used by methods of the DES simulation program to store data collected during the operation of the DES object.

Class **TDES_OBJECT_SYSTEM_ATTRIBUTE:**

```
def __init__(self):
    DESAttribute_Name_str = ""
    DESAttribute_Value_str = ""
```

12. User properties of the object

A vector that contains the user properties of a DES object. A DES object is a directory structure that contains **TDES_OBJECT_USER_ATTRIBUTE** data structure elements.

Stores string data that can be identified by the property name.

This vector can be applied by the user to custom data storage, calculation, and data recall tasks for operations on the DES object.

Class **TDES_OBJECT_USER_ATTRIBUTE:**

```
def __init__(self):
    DESAttribute_Name_str = ""
    DESAttribute_Value_str = ""
```

13. Object data table matrix

You can also store the user properties of a DES object in a 2D matrix that contains a string element. This matrix can be applied by the user to custom data storage, calculation, and data recall tasks for the DES object operation.

14. Position of the object

The DES object is the `self.DESObject_Geometrical_Position` data in the object is used to store the position of the DES object. The position coordinates dimension [m].

Class **TDESObject_Position**:

```
def __init__(self):  
    self.X_coordinate = 0.0  
    self.Y_coordinate = 0.0  
    self.Z_coordinate = 0.0
```

15. The speed of the object

The object is `self.DESObject_Geometrical_Speed` data contained in the object stores the speed of the DES object. The dimension of velocity coordinates is [m/s].

Class **TDESObject_Speed**:

```
def __init__(self):  
    self.into_X_direction = 0.0  
    self.into_Y_direction = 0.0  
    self.into_Z_direction = 0.0
```

16. Acceleration of the object

The object is `self.DESObject_Geometrical_Acceleration` data contained in the object stores the acceleration of the DES object. The acceleration coordinate dimension is [m/s²].

Class **TDESObject_Acceleration**:

```
def __init__(self):  
    self.into_X_direction = 0.0  
    self.into_Y_direction = 0.0  
    self.into_Z_direction = 0.0
```

17. Properties of object base objects

TSOURCE, TBUFFER, TMACHINE, TSINK, TWRAPPER, TUNWRAPPER are base objects whose special properties assigned only to the given DES object type are described in chapters 5.7.1 to 5.7.6.

18. Method of object: Properties of derived objects of the object

TPATH, TLOCK, TUNLOCK are derived objects (enhanced from the **TMACHINE** object) whose special properties assigned only to the specific DES object type are described in chapters 6.7.7 to 6.7.9.

The following is a description of the methods of the DES object, which always has at least one input parameter. To distinguish it from properties, we use a pair of parentheses after each method name () to indicate that this name is the name of a method.

19. Object method: When Entity enters the input channel of the DES object

This procedure is performed for each DES object when an entity has arrived in an input channel of the DES object but executes instructions for the current DES object only for the selected DES object. The procedure is one of the procedures of the **TDES_BRANCH** object for technical reasons, but it concerns the **TDES_OBJECT**.

As an example, we show an implementation of the **DESBranch_ON_AFTER_ENTITY_ENTERED_into_InputChannel_of_DESObject()** procedure:

```
#####
#####
#####
#####
def
DESBranch_ON_AFTER_ENTITY_ENTERED_into_InputChannel_of_DESObject(
    Self
    DES_Object, # TDES_OBJECT,
    Entity, #TDES_ENTITY,

    #Python Output:
    # return [Memo_str]
):
    """
    This procedure is performed for each DES_Object if the Entity has
    arrived in one of the input channels of the DES_Object.
    """

    Memo_str = ''

    #####
    #####
    #####
    #####
    if ((self. DESBranch_Name_str == 'Model_06')
        and (DES_Object.DESObject_Name_str == 'BUFFER_WS_011')):
        Entity.DESEntity_SELF_MANAGED_bool = False

    #####
    #####
    #####
    #####

    return [Memo_str]
```

```
#end ofdef
DESBranch_ON_AFTER_ENTITY_ENTERED_into_InputChannel_of_DESObject
#-----
-----
```

20. Object method: When Entity enters DES object

This procedure is performed for each DES object when an Entity has entered the DES object (the Entity Store) but executes the instructions for the current DES object only for the selected DES object.

The procedure is one of the procedures of the **TDES_BRANCH** object for technical reasons, but it concerns the **TDES_OBJECT**.

As an example, we show an implementation of the

DESBranch_ON_AFTER_ENTITY_ENTERED_into_DESObject () procedure:

```
#####
#####
#####
#####
def DESBranch_ON_AFTER_ENTITY_ENTERED_into_DESObject(
    Self
    DES_Object, # TDES_OBJECT,
    Entity, #TDES_ENTITY,

    # Python Output:
    # return [Memo_str]
):
    """
    This procedure is carried out for each DES_Object,
    if the Entity has just entered DES_Object.
    """

    Memo_str = ''

    #####
    #####
    #####
    #####

    if ((self.DESBranch_Name_str == 'UM_Model_03')
        and (DES_Object.DESObject_Name_str == 'Sated')):

        Entity.DESEntity_SELF_MANAGED_bool =True

    #####
    #####
    #####
    #####

    return [Memo_str]

#end of def DESBranch_ON_AFTER_ENTITY_ENTERED_into_DESObject
#-----
-----
```

21. Object method: When Entity exits DES object

This procedure is performed for each DES object when an entity is in a state immediately before exiting the DES object (the Entity Store) but executes the instructions for the current DES object only for the selected DES object.

The procedure is one of the procedures of the **TDES_BRANCH** object for technical reasons, but it concerns the **TDES_OBJECT**.

As an example, we show an implementation of the

DESBranch_ON_BEFORE_ENTITY_EXITING_from_DESObject () procedure:

```
#####
#####
#####
#####
def DESBranch_ON_BEFORE_ENTITY_EXITING_from_DESObject(
    Self
    DES_Object, # TDES_OBJECT,
    Entity, #TDES_ENTITY,

    # Python Output:
    # return [Memo_str]
    ):
    """
    This procedure is performed for each DES_Object if the entity is just
    before exiting DES_Object.
    """

    Memo_str = ''

    #####
    #####
    #####
    #####
    if ((self. DESBranch_Name_str == 'Model_06')
        and (DES_Object.DESObject_Name_str == 'SINK_BUFFER')):

        Entity.DESEntity_SELF_MANAGED_bool =False

        DES_Object.DESObject_OutputChannel_Index_Selection_Strategy.Set_Item_
        str_to(
            'TSelection_Constant_Index')

            if(Entity.DESEntity_Caption_str == 'AA_product'):
                DES_Object.DESObject_OutputChannel_Index = 0
            #AA_product index

            elif(Entity.DESEntity_Caption_str == 'BB_product'):
                DES_Object.DESObject_OutputChannel_Index = 1#
            BB_product index

            elif(Entity.DESEntity_Caption_str == 'CC_product'):
                DES_Object.DESObject_OutputChannel_Index = 2#
            CC_product index

    #####
    #####
```

```
#%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
&&&&  &&&

        return [Memo_str]

#end of def DESBranch_ON_BEFORE_ENTITY_EXITING_from_DESObject
#-----
-----
```

22. When the Entity exits to the output channel of the DES object

This procedure is performed for each DES object when an entity has arrived in an output channel of the DES object but executes the instructions for the current DES object only for the selected DES object.

The procedure is one of the procedures of the **TDES_BRANCH** object for technical reasons, but it concerns the **TDES_OBJECT**.

As an example, we show an implementation of the

DESBranch_ON_AFTER_ENTITY_ENTERED_into_OutputChannel_of_DESObject () procedure:

```
#####
#####
#####
#####
def
DESBranch_ON_AFTER_ENTITY_ENTERED_into_OutputChannel_of_DESObject(
    Self
    DES_Object, # TDES_OBJECT,
    Entity, #TDES_ENTITY,

    # Python Output:
    # return [Memo_str]
):
    """
```

This procedure is performed for each DES_Object if the entity has already exited DES_Object and entered one of the DES_Object's output channels.

"""

```
Memo_str = ''  
  
#&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&  
&&&&&&&  
#&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&  
&&&&&&&  
  
    if ((self.DESBranch_Name_str == 'Model_06')  
        and ( (DES_Object.DESObject_Name_str == 'WORK_STATION_011')  
              or (DES_Object.DESObject_Name_str == 'WORK_STATION_011A')  
              or (DES_Object.DESObject_Name_str == 'WORK_STATION_011B')  
              or (DES_Object.DESObject_Name_str == 'WORK_STATION_012')  
              or (DES_Object.DESObject_Name_str == 'WORK_STATION_021')  
              or (DES_Object.DESObject_Name_str == 'WORK_STATION_022')  
              or (DES_Object.DESObject_Name_str == 'WORK_STATION_023')  
              or (DES_Object.DESObject_Name_str == 'WORK_STATION_031')  
              or (DES_Object.DESObject_Name_str == 'WORK_STATION_032')  
            )):  
  
                Length_Of_OrderList  
=len(Entity.DESEntity_SELF_MANAGED_OrderList)  
Entity.DESEntity SELF MANAGED OrderList Index += 1
```

```

        if (Entity.DESEntity_SELF_MANAGED_OrderList_Index <
Length_Of_OrderList):
            Entity.DESEntity_SELF_MANAGED_OrderList_Record =\
                Entity.DESEntity_SELF_MANAGED_OrderList[
                    Entity.DESEntity_SELF_MANAGED_OrderList_Index]
        else:
            Entity.DESEntity_SELF_MANAGED_OrderList_Index = 5
            #Exit from Circular Service

#####
####
#####
####
        if ((self. DESBranch_Name_str == 'Model_06')
            and (DES_Object.DESObject_Name_str == 'BUFFER_WS_011')):

            Entity.DESEntity_SELF_MANAGED_bool =True

#####
####
#####
####
        if ((self. DESBranch_Name_str == 'Model_116')
            and (DES_Object.DESObject_Name_str == 'Daily_Feeding.Sated')):

            Entity.DESEntity_SELF_MANAGED_bool =False

#####
####
#####
####
        if ((self. DESBranch_Name_str == 'UM_Model_03')
            and (DES_Object.DESObject_Name_str == 'Sated')):

            Entity.DESEntity_SELF_MANAGED_bool =False

#####
####
#####
####

        return [Memo_str]

#end of def
DESBbranch_ON_AFTER_ENTITY_ENTERED_into_OutputChannel_of_DESObject
#-----
-----

```


23. Object (other) methods

The DES object has several methods, which are described in Section 6.7, "**Methods of the TDES_OBJECT**".

The methods of the DES object are:

```
def DESObject_ON_PROCESS_CALL()
def DESObject_Set_System_Attribute()
def DESObject_Set_User_Attribute()
def DESObject_Delete_System_Attribute()
def DESObject_Delete_User_Attribute()
def DESObject_Get_System_Attribute()
def DESObject_Get_User_Attribute()
def DESObject_Update_Work_State_with_Commanded_State()
def DESObject_Select_Of_InputChannel_Index()
def DESObject_Select_Of_OutputChannel_Index()
def DESObject_InputChannel_Index_Is_Correct_bool()
def DESObject_OutputChannel_Index_Is_Correct_bool()
def DESObject_Channel_Is_Connected()
def DESObject_Calculate_WORKED_Entity_Time_Attributes()
def DESObject_ON_EXTERNAL_InputChannel_Index_Selection()
def DESObject_ON_EXTERNAL_OutputChannel_Index_Selection()
```

4.1.1 Programming TDES_OBJECT/TSOURCE

Define the **TDES_OBJECT/TSOURCE** DES object and set its key properties.

Define the TDES_OBJECT

```
DES_OBJECT_1 = TDES_OBJECT(
    TSOURCE,      #DES object type
    'Source1',    # naming #DES object
    0,            # Number of input channels
    6,            # number of output channels
)
```

Set TDES_OBJECT attributes

Set the TDES_OBJECT output channel selection strategy.

```
DES_OBJECT_1.DESObject_OutputChannel_Index_Selection_Strategy.Set_Item_s
tr_to(
'TSelection_Random_Selected_Index')

# Possible setting values:
# (I/O) = means the attribute can be applied at InputChannel and Output
Channel Selection
"""
TDES_Channel_Index_Selection_Strategy_tuple =(
    'TSelection_Constant_Index', #=0 (I/O)
    'TSelection_Random_Selected_Index', #=1 (I/O)
    'TSelection_Cyclical_Selected_Index', #=2 (I/O) Round Robin type
selection
    'TSelection_First_Available_Index_Start_From_First_Index', #=3 (I/O)
    'TSelection_First_Available_Index_Start_From_Last_Index_From_Back',
#=4 (I/O)

# DESAttribute_Name_str is "Selected_InputChannel_Index" or
"Selected_OutputChannel_Index"
    'TSelection_By_DESObject_User_Attribute', #=5 (I/O)

    'TSelection_By_Channel_Ratio_Values', #=6 (I/O)
    'TSelection_by_External_Selected_Index', #=7 (I/O)
    'TSelection_by_TIdle_State_Of_Connected_DESObject', #=8 (only at
Output)
    'TSelection_by_DESEntity_Priority_Value', #=9 (only at Output of
TBUFFER)
    'TSelection_by_DESEntity_Given_Name_str', #=10 (only at Output)
)
"""
```

Set the index for the TDES_OBJECT output channel.

```
DES_OBJECT_1.DESObject_OutputChannel_Index = 0
```

Constants for setting the TDES_OBJECT delay duration.

```
DES_OBJECT_1.SOURCE_Minimum_Of_Time = 1.000
DES_OBJECT_1.SOURCE_Usual_Of_Time = 2.000
DES_OBJECT_1.SOURCE_Maximum_Of_Time = 3.000
DES_OBJECT_1.SOURCE_Deviation_Of_Time = 1.000
DES_OBJECT_1.SOURCE_Mean_Of_Time = 1.000
DES_OBJECT_1.SOURCE_Constant_Value_Of_Time = 1.000
```

Set the TDES_OBJECT delay duration distribution function type.

```
DES_OBJECT_1.SOURCE_Distribution.Set_Item_str_to('TDistribution_Exponential_Mean')
```

```
# Possible setting values:
```

```
"""
TDES_Distribution_tuple =(
    'TDistribution_Constant_Value', #=0
    'TDistribution_Exponential_Mean', #=1
    'TDistribution_Normal_Mean_Deviation', #=2
    'TDistribution_Triangle_Minimum_Usual_Maximum', #=3
    'TDistribution_Uniform_Minimum_Maximum' #=4
)
"""
```

Set the naming of the Entity created with TDES_OBJECT.

```
DES_OBJECT_1.SOURCE_Created_Entity.DESEntity_Name_str =
'Created_Entity_Name'
```

Set the first release simulation time for an Entity created with TDES_OBJECT.

```
DES_OBJECT_1.SOURCE_First_Time_of_Entity_Creation = 0.000
```

Set the (maximum) count of Entities created with TDES_OBJECT.

```
DES_OBJECT_1.SOURCE_Maximum_Batch_Size=2000000000
```

Set the Container size for the TDES_OBJECT entity.

```
DES_OBJECT_1.DESObject_Capacity = 1
```

Set the most important properties of the TSOURCE object without detailed explanations.

```
DES_OBJECT_1 = TDES_OBJECT(
    TSOURCE,          #DES object type
    'Source1', naming #DES object
    0, #Bemeneti number of channels
    6, #Kimeneti number of channels
)

DES_OBJECT_1.DESObject_OutputChannel_Index_Selection_Strategy.Set_Item_s
tr_to(
'TSelection_Random_Selected_Index')
DES_OBJECT_1.DESObject_OutputChannel_Index = 0

    DES_OBJECT_1.SOURCE_Minimum_Of_Time = 1.000
    DES_OBJECT_1.SOURCE_Usual_Of_Time = 2.000
    DES_OBJECT_1.SOURCE_Maximum_Of_Time = 3.000
    DES_OBJECT_1.SOURCE_Deviation_Of_Time = 1.000
    DES_OBJECT_1.SOURCE_Mean_Of_Time = 1.000
    DES_OBJECT_1.SOURCE_Constant_Value_Of_Time = 1.000

    DES_OBJECT_1.SOURCE_Distribution.Set_Item_str_to(
'TDistribution_Exponential_Mean')

    DES_OBJECT_1.SOURCE_Created_Entity.DESEntity_Name_str =
'Created_Entity_Name'

    DES_OBJECT_1.SOURCE_First_Time_of_Entity_Creation = 0.000

    DES_OBJECT_1.SOURCE_Maximum_Batch_Size=2000000000

    DES_OBJECT_1.DESObject_Capacity = 1
```

4.1.2 Programming TDES_OBJECT/TBUFFER

Defines the **TDES_OBJECT/TBUFFER** DES object and sets its key properties.

Define the TDES_OBJECT

```
DES_OBJECT_2 = TDES_OBJECT(
    TBUFFER,          #DES object type
    'Buffer1', naming #DES object
    6, #Bemeneti number of channels
    6, #Kimeneti number of channels
)
```

Set TDES_OBJECT attributes

Set up the TDES_OBJECT input channel selection strategy.

```
DES_OBJECT_2.DESObject_InputChannel_Index_Selection_Strategy.Set_Item_str_to(
    'TSelection_Random_Selected_Index')

# Possible setting values:
# (I/O) = means the attribute can be applied at InputChannel and Output
# Channel Selection
"""
TDES_Channel_Index_Selection_Strategy_tuple =(
    'TSelection_Constant_Index', #=0 (I/O)
    'TSelection_Random_Selected_Index', #=1 (I/O)
    'TSelection_Cyclical_Selected_Index', #=2 (I/O) Round Robin type
    selection
    'TSelection_First_Available_Index_Start_From_First_Index', #=3 (I/O)
    'TSelection_First_Available_Index_Start_From_Last_Index_From_Back',
    #=4 (I/O)

# DESAttribute_Name_str is "Selected_InputChannel_Index" or
"Selected_OutputChannel_Index"
    'TSelection_By_DESObject_User_Attribute', #=5 (I/O)

    'TSelection_By_Channel_Ratio_Values', #=6 (I/O)
    'TSelection_by_External_Selected_Index', #=7 (I/O)
    'TSelection_by_TIdle_State_Of_Connected_DESObject', #=8 (only at
Output)
    'TSelection_by_DESEntity_Priority_Value', #=9 (only at Output of
TBUFFER)
    'TSelection_by_DESEntity_Given_Name_str', #=10 (only at Output)
)
"""
```

Set the index for the TDES_OBJECT input channel.

```
DES_OBJECT_2.DESObject_InputChannel_Index = 0
```

Set the TDES_OBJECT output channel selection strategy.

```
DES_OBJECT_2.DESObject_OutputChannel_Index_Selection_Strategy.Set_Item_str_to(
'TSelection_Random_Selected_Index')

# Possible setting values:
# (I/O) = means the attribute can be applied at InputChannel and Output
Channel Selection
"""
TDES_Channel_Index_Selection_Strategy_tuple =(
'TSelection_Constant_Index', #=0 (I/O)
'TSelection_Random_Selected_Index', #=1 (I/O)
'TSelection_Cyclical_Selected_Index', #=2 (I/O) Round Robin type
selection
'TSelection_First_Available_Index_Start_From_First_Index', #=3 (I/O)
'TSelection_First_Available_Index_Start_From_Last_Index_From_Back',
#=4 (I/O)

# DESAttribute_Name_str is "Selected_InputChannel_Index" or
"Selected_OutputChannel_Index"
'TSelection_By_DESObject_User_Attribute', #=5 (I/O)

'TSelection_By_Channel_Ratio_Values', #=6 (I/O)
'TSelection_by_External_Selected_Index', #=7 (I/O)
'TSelection_by_TIdle_State_Of_Connected_DESObject', #=8 (only at
Output)
'TSelection_by_DESEntity_Priority_Value', #=9 (only at Output of
TBUFFER)
'TSelection_by_DESEntity_Given_Name_str', #=10 (only at Output)
)
"""
```

Set the index for the TDES_OBJECT output channel.

```
DES_OBJECT_2.DESObject_OutputChannel_Index = 0
```

Set up the Container item selection strategy for the TDES_OBJECT entity.

```
DES_OBJECT_2.BUFFER_Type_Of_Queue.Set_Item_str_to('TQueue_First_In_First
_Out')

# Possible setting values:
TDES_Queue_Type_tuple =(
'TQueue_First_In_First_Out', #=0 FIFO
'TQueue_Last_In_First_Out', #=1 LIFO
'TQueue_Entity_With_Lowest_Priority_Value', #=2
'TQueue_Entity_With_Highest_Priority_Value', #=3
'TQueue_Entity_With_BUFFER_Match_Value' #=4
)
```

Set the Container size for the TDES_OBJECT entity.

```
DES_OBJECT_2.DESObject_Capacity = 10
```

Set the most important properties of the TBUFFER object without detailed explanations.

```
DES_OBJECT_2 = TDES_OBJECT(  
    TBUFFER, #DES object type  
    'Buffer1', naming #DES object  
    6, #Bemeneti number of channels  
    6, #Kimeneti number of channels  
)  
  
DES_OBJECT_2.DESObject_InputChannel_Index_Selection_Strategy.Set_Item_str_to(  
    'TSelection_Random_Selected_Index')  
DES_OBJECT_2.DESObject_InputChannel_Index = 0  
  
DES_OBJECT_2.DESObject_OutputChannel_Index_Selection_Strategy.Set_Item_str_to(  
    'TSelection_Random_Selected_Index')  
DES_OBJECT_2.DESObject_OutputChannel_Index = 0  
  
DES_OBJECT_2.BUFFER_Type_Of_Queue.Set_Item_str_to('TQueue_First_In_First_Out')  
  
DES_OBJECT_2.DESObject_Capacity = 10
```

4.1.3 Programming TDES_OBJECT/TMACHINE

Define the **TDES_OBJECT/TMACHINE** DES object and set its key properties.

Define the TDES_OBJECT

```
DES_OBJECT_3 = TDES_OBJECT(
    TMACHINE, #DES object type
    'Machine1', naming #DES object
    6, #Bemeneti number of channels
    6, #Kimeneti number of channels
)
```

Set TDES_OBJECT attributes

Set up the TDES_OBJECT input channel selection strategy.

```
DES_OBJECT_3.DESObject_InputChannel_Index_Selection_Strategy.Set_Item_str_to(
    'TSelection_Random_Selected_Index')

# Possible setting values:
# (I/O) = means the attribute can be applied at InputChannel and Output
# Channel Selection
"""
TDES_Channel_Index_Selection_Strategy_tuple =(
    'TSelection_Constant_Index', #=0 (I/O)
    'TSelection_Random_Selected_Index', #=1 (I/O)
    'TSelection_Cyclical_Selected_Index', #=2 (I/O) Round Robin type
    selection
    'TSelection_First_Available_Index_Start_From_First_Index', #=3 (I/O)
    'TSelection_First_Available_Index_Start_From_Last_Index_From_Back',
    #=4 (I/O)

# DESAttribute_Name_str is "Selected_InputChannel_Index" or
"Selected_OutputChannel_Index"
    'TSelection_By_DESObject_User_Attribute', #=5 (I/O)

    'TSelection_By_Channel_Ratio_Values', #=6 (I/O)
    'TSelection_by_External_Selected_Index', #=7 (I/O)
    'TSelection_by_TIdle_State_Of_Connected_DESObject', #=8 (only at
Output)
    'TSelection_by_DESEntity_Priority_Value', #=9 (only at Output of
TBUFFER)
    'TSelection_by_DESEntity_Given_Name_str', #=10 (only at Output)
)
"""
```


Set the index for the TDES_OBJECT input channel.

```
DES_OBJECT_3.DESObject_InputChannel_Index = 0
```

Set the TDES_OBJECT output channel selection strategy.

```
DES_OBJECT_3.DESObject_OutputChannel_Index_Selection_Strategy.Set_Item_str_to(
'TSelection_Random_Selected_Index')

# Possible setting values:
# (I/O) = means the attribute can be applied at InputChannel and Output
Channel Selection
"""
TDES_Channel_Index_Selection_Strategy_tuple = (
'TSelection_Constant_Index', #=0 (I/O)
'TSelection_Random_Selected_Index', #=1 (I/O)
'TSelection_Cyclical_Selected_Index', #=2 (I/O) Round Robin type
selection
'TSelection_First_Available_Index_Start_From_First_Index', #=3 (I/O)
'TSelection_First_Available_Index_Start_From_Last_Index_From_Back',
#=4 (I/O)

# DESAttribute_Name_str is "Selected_InputChannel_Index" or
"Selected_OutputChannel_Index"
'TSelection_By_DESObject_User_Attribute', #=5 (I/O)

'TSelection_By_Channel_Ratio_Values', #=6 (I/O)
'TSelection_by_External_Selected_Index', #=7 (I/O)
'TSelection_by_TIdle_State_Of_Connected_DESObject', #=8 (only at
Output)
'TSelection_by_DESEntity_Priority_Value', #=9 (only at Output of
TBUFFER)
'TSelection_by_DESEntity_Given_Name_str', #=10 (only at Output)
)
"""
```

Set the index for the TDES_OBJECT output channel.

```
DES_OBJECT_3.DESObject_OutputChannel_Index = 0
```

Constants for setting the TDES_OBJECT delay duration.

```
DES_OBJECT_3.MACHINE_Minimum_Of_Time = 1.000
DES_OBJECT_3.MACHINE_Usual_Of_Time = 2.000
DES_OBJECT_3.MACHINE_Maximum_Of_Time = 3.000
DES_OBJECT_3.MACHINE_Deviation_Of_Time = 1.000
DES_OBJECT_3.MACHINE_Mean_Of_Time = 1.000
DES_OBJECT_3.MACHINE_Constant_Value_Of_Time = 1.000
```

Set the TDES_OBJECT delay duration distribution function type.

```
DES_OBJECT_3.MACHINE_Distribution.Set_Item_str_to('TDistribution_Constant_Value')

# Possible setting values:
"""
TDES_Distribution = (
'TDistribution_Constant_Value', #=0
```

```

'TDistribution_Exponential_Mean', #=1
'TDistribution_Normal_Mean_Deviation', #=2
'TDistribution_Triangle_Minimum_Usual_Maximum', #=3
'TDistribution_Uniform_Minimum_Maximum' #=4
)
"""

```

Set the Container size for the TDES_OBJECT entity.

```
DES_OBJECT_3.DESObject_Capacity = 1
```

Set the most important properties of the TMACHINE object without detailed explanations.

```

DES_OBJECT_3 = TDES_OBJECT(
    TMACHINE, #DES object type
    'Machine1', naming #DES object
    6, #Bemeneti number of channels
    6, #Kimeneti number of channels
)

DES_OBJECT_3.DESObject_InputChannel_Index_Selection_Strategy.Set_Item_str_to(
    'TSelection_Random_Selected_Index')
DES_OBJECT_3.DESObject_InputChannel_Index = 0

DES_OBJECT_3.DESObject_OutputChannel_Index_Selection_Strategy.Set_Item_str_to(
    'TSelection_Random_Selected_Index')
DES_OBJECT_3.DESObject_OutputChannel_Index = 0

DES_OBJECT_3.MACHINE_Minimum_Of_Time = 1.000
DES_OBJECT_3.MACHINE_Usual_Of_Time = 2.000
DES_OBJECT_3.MACHINE_Maximum_Of_Time = 3.000
DES_OBJECT_3.MACHINE_Deviation_Of_Time = 1.000
DES_OBJECT_3.MACHINE_Mean_Of_Time = 1.000
DES_OBJECT_3.MACHINE_Constant_Value_Of_Time = 1.000

DES_OBJECT_3.MACHINE_Distribution.Set_Item_str_to('TDistribution_Constant_Value')

DES_OBJECT_3.DESObject_Capacity = 1

```

4.1.4 Programming TDES_OBJECT/TSINK

Define the **TDES_OBJECT/TSINK** DES object and set its key properties.

Define the TDES_OBJECT

```
DES_OBJECT_4 = TDES_OBJECT(  
    TSINK, #DES object type  
    'Sink1', naming #DES object  
    6, #Bemeneti number of channels  
    0.#Kimeneti number of channels  
)
```

4.1.5 Programming TDES_OBJECT/TWRAPPER

Define the **TDES_OBJECT/TWRAPPER** DES object and set its key properties.

Define the TDES_OBJECT

```
DES_OBJECT_5 = TDES_OBJECT(  
    TWRAPPER, #DES object type  
    'Wrapper01', naming #DES object  
    6, #Bemeneti number of channels  
    1, #Kimeneti number of channels  
)
```

Define attributes for TDES_OBJECT

```
DES_OBJECT_5.WRAPPER_Entity_Request_At_Channel[0] = 1;  
DES_OBJECT_5.WRAPPER_Entity_Request_At_Channel[1] = 2;  
DES_OBJECT_5.WRAPPER_Entity_Request_At_Channel[2] = 2;  
DES_OBJECT_5.WRAPPER_Entity_Request_At_Channel[3] = 0;  
DES_OBJECT_5.WRAPPER_Entity_Request_At_Channel[4] = 0;  
DES_OBJECT_5.WRAPPER_Entity_Request_At_Channel[5] = 0;
```

4.1.6 Programming TDES_OBJECT/TUNWRAPPER

Defines the **TDES_OBJECT/TUNWRAPPER** DES object and sets its key properties.

Define the TDES_OBJECT

```
DES_OBJECT_6 =TDES_OBJECT(
    TUNWRAPPER,      # DES object type
    'UnWrapper1',    # naming #DES object
    1,               # Number of input channels
    6                # Number of output channels
)
```

Define attributes for TDES_OBJECT

Set the number of Entities emitted so far on TDES_OBJECT output channels.

```
for i in range(DES_OBJECT_6.DESObject_Number_Of_OutputChannels):
    DES_OBJECT_6.UNWRAPPER_Entity_Amount_At_Channel[i] = 0
```

Set the start state of the TDES_OBJECT state machine.

```
DES_OBJECT_6.UNWRAPPER_Step_Sequence.Set_Item_str_to(
    'TUnWrapper_Waiting_for_Packed_Object')
```

Possible setting values:

"""

```
TDES_UnWrapper_Step_Sequence_tuple =(
    'TUnWrapper_Waiting_for_Packed_Object', #=0
    'TUnWrapper_Object_is_Arrived', #=1
    'TUnWrapper_UnPack_Objects_Into_Buffer', #=2
    'TUnWrapper_Waiting_for_Sending_Away_Objects', #=3
    'TUnWrapper_Objects_Went_Away' #=4
)
```

"""

Set the most important properties of the **TUNWRAPPER** object without detailed explanations.

```
DES_OBJECT_6 =TDES_OBJECT(
    TUNWRAPPER, #DES object type
    'UnWrapper1', naming #DES object
    1, #Bemeneti number of channels
    6 #Kimeneti number of channels
)

for i in range(DES_OBJECT_6.DESObject_Number_Of_OutputChannels):
    DES_OBJECT_6.UNWRAPPER_Entity_Amount_At_Channel[i] = 0

DES_OBJECT_6.UNWRAPPER_Step_Sequence.Set_Item_str_to(
    'TUnWrapper_Waiting_for_Packed_Object')
```

4.1.7 Programming TDES_OBJECT/TPATH

Define the **TDES_OBJECT/TPATH** DES object and set its key properties.

Define the TDES_OBJECT

```
DES_OBJECT_7 = TDES_OBJECT(
    TPATH, #DES object type
    'Gruista_Back_P_TPath_Control_in_B', naming #DES object
    6, #Bemeneti number of channels
    6, #Kimeneti number of channels
)
```

Define attributes for TDES_OBJECT

Set up the TDES_OBJECT input channel selection strategy.

```
DES_OBJECT_7.DESObject_InputChannel_Index_Selection_Strategy.Set_Item_str_to('TSelection_Random_Selected_Index')

# Possible setting values:
# (I/O) = means the attribute can be applied at InputChannel and Output Channel Selection
"""
TDES_Channel_Index_Selection_Strategy_tuple =(
    'TSelection_Constant_Index', #=0 (I/O)
    'TSelection_Random_Selected_Index', #=1 (I/O)
    'TSelection_Cyclical_Selected_Index', #=2 (I/O) Round Robin type selection
    'TSelection_First_Available_Index_Start_From_First_Index', #=3 (I/O)
    'TSelection_First_Available_Index_Start_From_Last_Index_From_Back',
    #=4 (I/O)

    # DESAttribute_Name_str is "Selected_InputChannel_Index" or "Selected_OutputChannel_Index"
    'TSelection_By_DESObject_User_Attribute', #=5 (I/O)

    'TSelection_By_Channel_Ratio_Values', #=6 (I/O)
    'TSelection_by_External_Selected_Index', #=7 (I/O)
    'TSelection_by_TIdle_State_Of_Connected_DESObject', #=8 (only at Output)
    'TSelection_by_DESEntity_Priority_Value', #=9 (only at Output of TBUFFER)
    'TSelection_by_DESEntity_Given_Name_str', #=10 (only at Output)
)
"""
```

Set the index for the TDES_OBJECT input channel.

```
DES_OBJECT_7.DESObject_InputChannel_Index = 0
```

Set the TDES_OBJECT output channel selection strategy.

```
DES_OBJECT_7.DESObject_OutputChannel_Index_Selection_Strategy.Set_Item_str_to('TSelection_by_TIdle_State_Of_Connected_DESObject')

# Possible setting values:
```

```

# (I/O) = means the attribute can be applied at InputChannel and Output
Channel Selection
"""
TDES_Channel_Index_Selection_Strategy_tuple =(
    'TSelection_Constant_Index', #=0 (I/O)
    'TSelection_Random_Selected_Index', #=1 (I/O)
    'TSelection_Cyclical_Selected_Index', #=2 (I/O) Round Robin type
selection
    'TSelection_First_Available_Index_Start_From_First_Index', #=3 (I/O)
    'TSelection_First_Available_Index_Start_From_Last_Index_From_Back',
#=4 (I/O)

# DESAttribute_Name_str is "Selected_InputChannel_Index" or
"Selected_OutputChannel_Index"
    'TSelection_By_DESObject_User_Attribute', #=5 (I/O)

    'TSelection_By_Channel_Ratio_Values', #=6 (I/O)
    'TSelection_by_External_Selected_Index', #=7 (I/O)
    'TSelection_by_TIdle_State_Of_Connected_DESObject', #=8 (only at
Output)
    'TSelection_by_DESEntity_Priority_Value', #=9 (only at Output of
TBUFFER)
    'TSelection_by_DESEntity_Given_Name_str', #=10 (only at Output)
)
"""

```

Set the index for the TDES_OBJECT output channel.

```
DES_OBJECT_7.DESObject_OutputChannel_Index = 0
```

Set the TDES_OBJECT delay duration distribution function type.

```
DES_OBJECT_7.BUFFER_Type_Of_Queue.Set_Item_str_to('TQueue_First_In_First
_Out')
```

Possible setting values:

```

TDES_Queue_Type_tuple =(
    'TQueue_First_In_First_Out', #=0 FIFO
    'TQueue_Last_In_First_Out', #=1 LIFO
    'TQueue_Entity_With_Lowest_Priority_Value', #=2
    'TQueue_Entity_With_Highest_Priority_Value', #=3
    'TQueue_Entity_With_BUFFER_Match_Value'          #=4
)

```

Set the Container size for the TDES_OBJECT entity.

```
DES_OBJECT_7.DESObject_Capacity = 10
```

Set the length of the TDES_OBJECT PATH path.

```
DES_OBJECT_7.PATH_Length = 20.000 #[m]
```

Set the count of TDES_OBJECT PATH paths.

```
DES_OBJECT_7.PATH_Number_of_Tracks = 6
```

Set the acceleration of the TDES_OBJECT PATH to Entity.

```
DES_OBJECT_7.PATH_Acceleration = 2.000 #[m/s^2]
```

Set the Entity speed in TDES_OBJECT PATH.

```
DES_OBJECT_7.PATH_Constant_Velocity = 2.000 #[m/s]
```

Set the TDES_OBJECT PATH to Entity deceleration.

```
DES_OBJECT_7.PATH_Retardation = -2.000 #[m/s^2]
```

Set the TDES_OBJECT PATH path to Entity Total Delay.

```
DES_OBJECT_7.PATH_Total_Delay_Time = 3.000 #[s]
```

In the TDES_OBJECT PATH path, the Entity has only the Total Delay Duration attribute

Use?.

```
DES_OBJECT_7.PATH_Use_Only_Total_Delay_Time_bool = False
```

Does TDES_OBJECT PATH require an update to the Entity delay duration?.

```
DES_OBJECT_7.PATH_Need_Parameter_Recalculation_bool = True
```

Set key properties of the **TPATH** object without detailed explanations.

```
DES_OBJECT_7 = TDES_OBJECT(
    TPATH, #DES object type
    'Gruista_Back_P_TPath_Control_in_B', naming #DES object
    6, #Bemeneti data number of channels
    6, #Kimeneti data number of channels
)

DES_OBJECT_7.DESObject_InputChannel_Index_Selection_Strategy.Set_Item_str_to(
    'TSelection_Random_Selected_Index')
DES_OBJECT_7.DESObject_InputChannel_Index = 0

DES_OBJECT_7.DESObject_OutputChannel_Index_Selection_Strategy.Set_Item_str_to(
    'TSelection_by_TIdle_State_Of_Connected_DESObject')
DES_OBJECT_7.DESObject_OutputChannel_Index = 0

DES_OBJECT_7.BUFFER_Type_Of_Queue.Set_Item_str_to('TQueue_First_In_First_Out')

DES_OBJECT_7.DESObject_Capacity = 10

DES_OBJECT_7.PATH_Length = 20.000 #[m]
DES_OBJECT_7.PATH_Number_of_Tracks = 6
```



```
DES_OBJECT_7.PATH_Acceleration = 2.000 #[m/s^2]
DES_OBJECT_7.PATH_Constant_Velocity = 2.000 #[m/s]
DES_OBJECT_7.PATH_Retardation = -2.000 #[m/s^2]

DES_OBJECT_7.PATH_Total_Delay_Time = 3.000 #[s]

DES_OBJECT_7.PATH_Use_Only_Total_Delay_Time_bool = False
DES_OBJECT_7.PATH_Need_Parameter_Recalculation_bool = True
```

4.1.8 Programming TDES_OBJECT/TLOCK

Defines the **TDES_OBJECT/TLOCK** DES object and sets its key properties.

Define the TDES_OBJECT

```
DES_OBJECT_8 = TDES_OBJECT(  
    TLOCK,    # DES object type  
    'LOCK',   # naming #DES object  
    1,        # Number of input channels  
    2,        # Number of output channels  
)
```

Define attributes for TDES_OBJECT

TDES_OBJECT LOCK is the limit value for the count of Entities.

```
DES_OBJECT_8.LOCK_Entity_Number_Limit_in_Segment = 26
```

TDES_OBJECT LOCK is the maximum number of Entities for the duration of the simulation.

```
DES_OBJECT_8.LOCK_Maximum_Number_of_Entities_in_Segment = 0
```

TDES_OBJECT LOCK is the current Count value of Entities while the simulation is running.

```
DES_OBJECT_8.LOCK_Actual_Number_of_Entities_in_Segment = 0
```

4.1.9 Programming TDES_OBJECT/TUNLOCK

Define the **TDES_OBJECT/TUNLOCK** DES object and set its key properties.

Define the TDES_OBJECT

```
DES_OBJECT_9 = TDES_OBJECT(  
    TUNLOCK, #DES object type  
    'UNLOCK', #DES object name  
    2, #Bemeneti number of channels  
    1, #kimeneti number of channels  
)
```

TDES_OBJECT has no attributes to set.

4.2 Programming TDES_CONNECTION

The connection between the output channel of a DES object and one of the input channels of another object (or itself) is implemented by the **TDES_CONNECTION** object.

After you create the **TDES_CONNECTION** object, you must set the name and output channel index of the output channel DES object, as well as the name of the input channel's DES object and the index of the input channel.

The connection object (**TDES_CONNECTION**) can only establish connections between channels from which ONLY ONE CONNECTION OBJECT can run/out.

Simulation system objects generally have more than one input and output, which are called input/output channels.

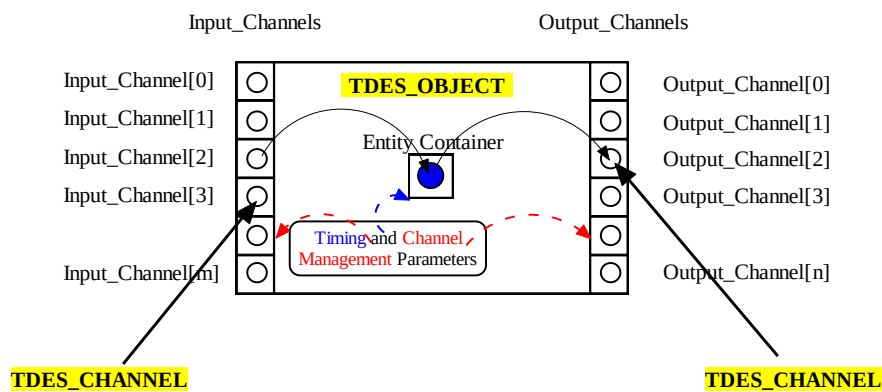


Figure 4.2.82 Channel objects (TDES_CHANNEL) in DES objects (TDES_OBJECT)

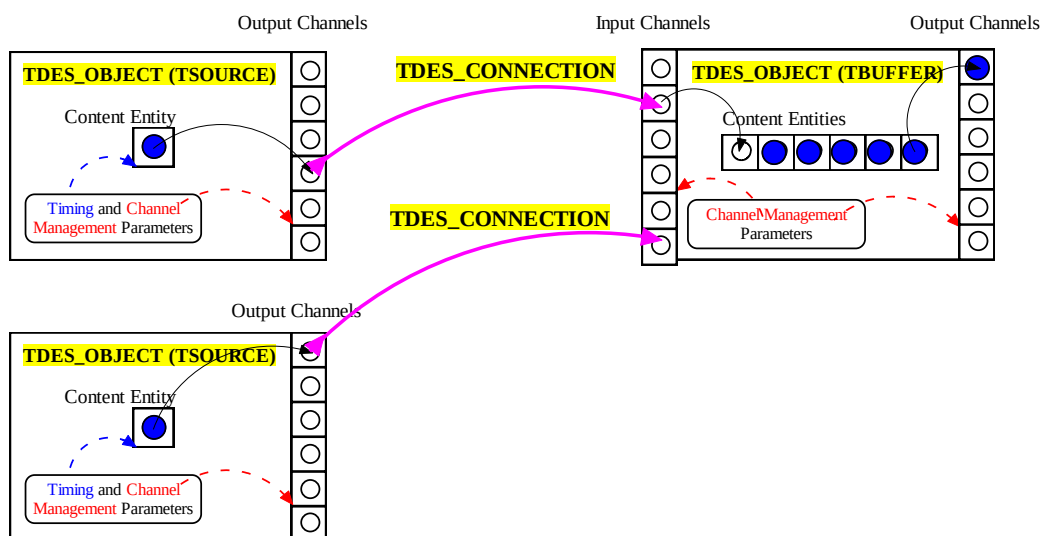


Figure 4.2.83 Connection objects (TDES_CONNECTION) between DES objects (TDES_OBJECT)

The interconnection between channel (**TDES_CHANNEL**) objects is implemented by connection (**TDES_CONNECTION**) objects. The output channel of objects in the simulation system can be connected to the input channel of another or its own object, creating a connection with it.

Incorrect connection *is when several output channels are connected to a single input channel*, because in this case the input channel cannot decide which output channel signal to accept as the input signal.

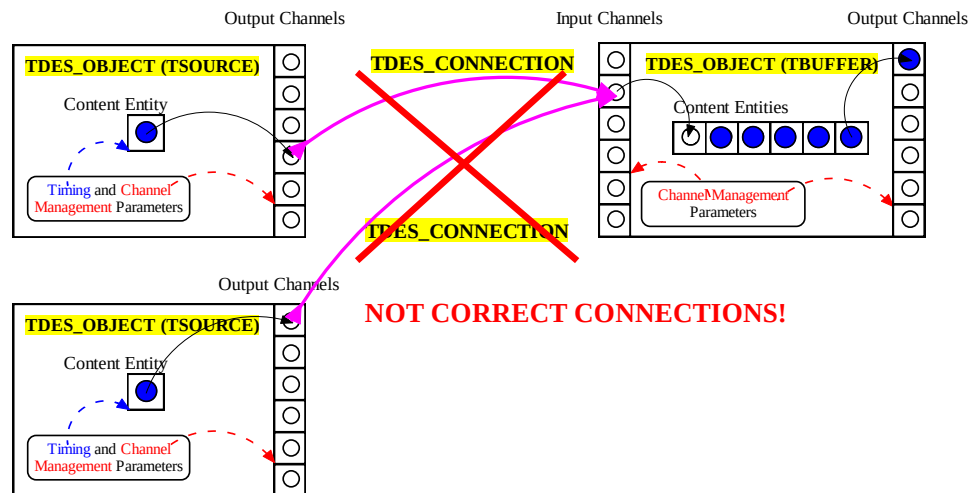


Figure 4.2.84 Incorrect (indeterminable) relationship objects (TDES_CONNECTION) between DES objects (TDES_OBJECT)

Similarly, it is incorrect *to link an output channel to two (or more) input channels*, because there is no clear definition of which input channel the output channel should pass the entity to.

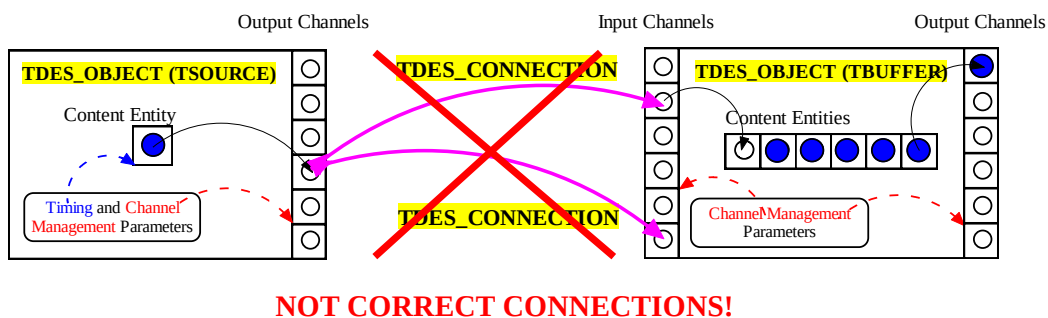


Figure 4.2.85 Incorrect (indeterminable) relationship objects (TDES_CONNECTION) between DES objects (TDES_OBJECT)

Based on the block diagram of the simulation model, the relationships between individual DES objects can be easily written.

This requires specifying which branch (**DESBranch_out**) of the DES model you want to create a connection from, which DES object (**DESObject_out**) you want to create a connection from, and which output index of the DES object (**DESChannel_out** to use).

Similarly, you must specify the parameters of the other end of the relationship, which is similarly the incoming branch (**DESBranch_in**), the DES object for the receipt of the connection (**DESObject_in**), and the index of the input channel (**DESChannel_in**) of this DES object where the connection object transports the Entity.

The following Python program snippet shows how to define a connection (**TDES_CONNECTION**).

```
#Source1(0) -> Buffer1(0)
#-----
# Define the TDES_CONNECTION object
    Connection =TDES_CONNECTION()

# Name the output channel of the TDES_CONNECTION object TDES_BRANCH object.
    Connection.DESConnection_DESBranch_Name_OUT_str =
    Branch.DESBranch_Name_str

# Name the output channel of the TDES_CONNECTION object TDES_OBJECT object.
    Connection.DESConnection_DESObject_Name_OUT_str = 'Source1'

# The index value of the output channel of the TDES_CONNECTION object.
    Connection.DESConnection_DESObject_Channel_Index_OUT = 0

# Name the TDES_CONNECTION object input channel TDES_BRANCH object.
    Connection.DESConnection_DESBranch_Name_IN_str =
    Branch.DESBranch_Name_str

# Name the TDES_CONNECTION object's input channel TDES_OBJECT object.
    Connection.DESConnection_DESObject_Name_IN_str = 'Buffer1'

# The index value of the input channel of the TDES_CONNECTION object.
    Connection.DESConnection_DESObject_Channel_Index_IN = 0

# Is the TDES_CONNECTION object allowed to function?.
    Connection.DESConnection_Enabled_bool = True

# Is tracing allowed for TDES_CONNECTION objects?.
    Connection.DESConnection_TRACED_bool = False
```

Set the most important properties of the **TDES_CONNECTION** object without detailed explanations.

```
#Source1(0) -> Buffer1(0)
#-----
    Connection =TDES_CONNECTION()

    Connection.DESConnection_DESBranch_Name_OUT_str =
    Branch.DESBranch_Name_str
    Connection.DESConnection_DESObject_Name_OUT_str = 'Source1'
```

```
Connection.DESConnection_DESObject_Channel_Index_OUT = 0

Connection.DESConnection_DESBranch_Name_IN_str =
Branch.DESBranch_Name_str
Connection.DESConnection_DESObject_Name_IN_str = 'Buffer1'
Connection.DESConnection_DESObject_Channel_Index_IN = 0

Connection.DESConnection_Enabled_bool = True
Connection.DESConnection_TRACED_bool = False
```

4.3 Programming TDES_ENTITY

Entity migration is basically determined by **TDES_OBJECT** objects using configured and mostly automated parameter definition procedures.

The (single) attribute of the **TDES_ENTITY** that allows the entity to bypass the hardwired output index selection strategy and specify another output channel index value that depends on another other condition.

This property is set by the Entity:

```
Self.DESEntity_SELF_MANAGED_bool = False
```

attribute.

The entity **DESEntity_SELF_MANAGED_bool** attribute of **Figure 4.3.86**. The automated output channel index is determined as shown.

1. The Entity entering the current **TDES_OBJECT** is **self.DESEntity_SELF_MANAGED_bool** value is set to **True**.
2. The **TDES_OBJECT** Determine the output channel index using the **Self.DESBRanch_ON_ENTITY_SELF_MANAGED_OutputChannel_Index_Setting ()** procedure.
3. The Entity exiting the current **TDES_OBJECT** is **self.DESEntity_SELF_MANAGED_bool** value is set to **False**.

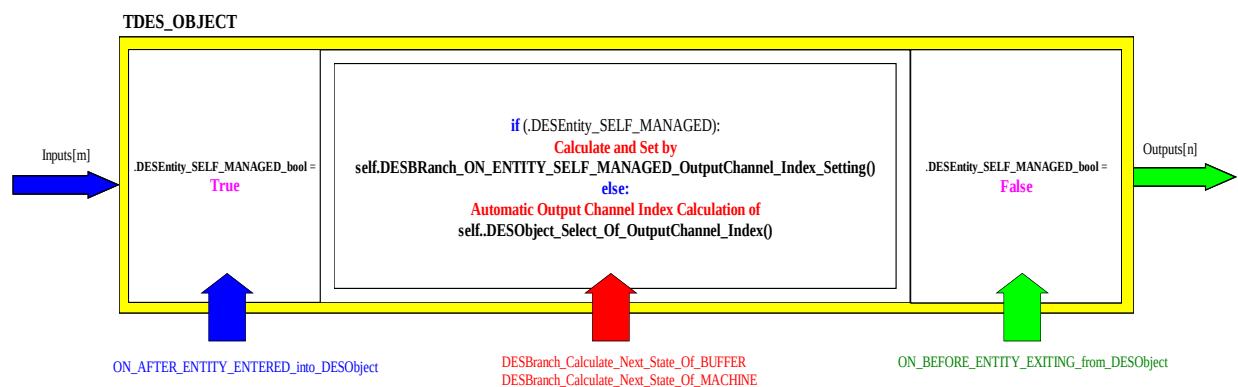


Figure 4.3.86 How **DESEntity_SELF_MANAGED_bool** works (43)

In other cases, the movement of the Entity is determined by the procedure that determines the index of the **TDES_OBJECT** output channel.

Use this Entity property to implement the programming of parts according to the specified list of operations in a plant. In this case, the same **TDES_OBJECT** can be visited multiple times by the

entity according to the operation statement to perform different operations over different time periods.

4.4 Creating a DES Python program.

To run models that contain a single branch, create these objects, and call their appropriate methods using the **Run_SINGLE_DESBranch.py** program.

When you run this Python program, the Python system loads the model objects and runs the model until the specified simulation time.

The results of the simulation (which are stored in several separate files) are stored in a user-defined directory. If you want to run multiple times with the same model, this can be easily solved by simply modifying the Run_SINGLE_DESBranch.py program.

The list of Run_SINGLE_DESBranch.py programs is as follows:

```
from CITYLOG_Main_Function_Program import CITYLOG_Main_Function

for i in range(1):
    CITYLOG_Main_Function(
        201,                # Model Number
        "UM_Model_01",      #Result_Files_Name_str
        '___xxx'+str(i+1)    # Files_Name_Extension_str
    )
```

The first line is the directory and method link that will be used to run the Python simulation program. Lines 3-8 contain the loop statement in which we call CITYLOG_Main_Function, the parameter specified:

- model number,
- result file,
- a file naming extension, which can distinguish between files belonging to different parameter runs of the model.

The CITYLOG_Main_Function is defined using the following procedure header:

```
def CITYLOG_Main_Function(
    Model_Number_int,          # Model Number
    Result_Files_Name_str,    #Result_Files_Name_str
    FileName_Post_str         #Files_Name_Extension_str
):
    # additional lines from the method's Python program...
```

For this program execution mode, the user only needs to enter the model number and result file names defined in CITYLOG_Main_Function.

By calling the **CITYLOG_Main_Function** method in the **CITYLOG_Main_Function_Program** directory, the following attributes must be set to run the User_Manual Model_01 program.

```
#User_Manual Model_01
elif(Model_Number == 201): # User_Manual_01
    Model_201 = TUM_Model_01('UM_Model_01')
    Branch = Model_201.Branch

# more Python program parts. . .
```

With this program snippet, we created object Model_201 and then the Branch object.

```
#User_Manual Model_01
if(Model_Number == 201):
    Branch.DESBranch_Simulationtime_End = minutes(1)

# more Python program parts. . .
```

This program snippet was used to set how long the simulation model should run.

As a reminder, we use various Python functions to set the exact times, which always give simulation seconds as a result.

Such functions include:

- seconds(seconds_float)
- minutes(minutes_float),
- hours(hours_float),
- days(days_float),

Each converts the xxx_float true value to the second dimension according to the unit of time specified by the procedure name.

A DES model consists of two basic parts:

- defining **TDES_OBJECT** objects of the model and setting their attributes,
- Defines **TDES_CONNECTION** objects that connect the input and output channels of DES objects.

4.4.1 Enable DES Python program result lists.

In DES Python *you can use logical variables to set* which of the files created because of the simulation will be created after the simulation is complete.

Since result files are text files, writing results to a file requires a significant amount of time. It is possible to create only those result files after the simulation that are absolutely necessary.

```
# CITYLOG_Main_Function_Program.py file line 481
#### Here we can choose which lists
#### appear as a description of the model.
#####
#####
#####
#####
#####
#####
#####
#### A   B E M E N E T I M O D E L L   L I S T A           ####
#####
#####
#####
#####
#####
#####
#####
```

The following Boolean variables output input data from the simulation model to `dátum__DES_Simulation_Result_10_Summary_Riport.txt` file.

```
# Branch.Print_ObjectList_summary_report_bool = Input data for True
```

The Boolean variable whose value is set to True produces `date__DES_Simulation_Result_10_Summary_Riport.txt` file. This is not where the variable value is set, this is just a note for clarity.

The Boolean variable whose value is set to True is included in the result file (`dátum__DES_Simulation_Result_10_Summary_Riport.txt`) is a **simplified (short) list of TDES_OBJECT objects defined in the model**.

If the Boolean variable is set to False, no such list is generated!

```
Branch.Print_Model_DESObjectList_bool = True # short DES_OBJECT list
```

The Boolean variable, set to True, is added to the result file (`dátum__DES_Simulation_Result_10_Summary_Riport.txt`) a **list of TDES_CONNECT objects defined in the model**.

If the Boolean variable is set to False, no such list is generated!

```
Branch.Print_Model_DESConnectionList_bool = False
```

The Boolean variable, whose value is set to True, is added to the result file (`dátum__DES_Simulation_Result_10_Summary_Riport.txt`) is a **list of TDES_CHANNEL objects defined in the model**. For each TDES_OBJECT, a list of set parameters for input and output channels.

If the Boolean variable is set to False, no such list is generated!

```
Branch.Print_Model_DESObject_DESChannelsList_bool = False
```

The Boolean variable, set to True, is added to the result file (datum__DES_Simulation_Result_10_Summary_Riport.txt) a list of TDES_TASK objects defined at startup in the model.

If the Boolean variable is set to False, no such list is generated!

```
Branch.Print_Model_Start_DESTaskList_bool = True
```


result file, which contains a complete list of TDES_ENTITY objects in the simulation model after the simulation is complete.

If the Boolean variable is set to False, no such list is generated!

```
Branch.Print_ObjectList_full_bool = False
```

The Boolean variable whose value is set to True produces

date__DES_Simulation_Result_10_Summary_Riport.txt

result file, which contains an abbreviated list of TDES_ENTITY objects and TDES_OBJECT objects in the simulation model after the simulation is complete, as well as the number of TDES_ENTITY objects received at the inputs of each TDES_OBJECT object during the simulation, as well as the number of TDES_ENTITY s left at their outputs. In addition, the file contains the percentage of time spent by each TDES_OBJECT in different operating states, taking the total simulation duration as 100%.

If the Boolean variable is set to False, no such list is generated!

```
Branch.Print_ObjectList_summary_report_bool = True
```

The Boolean variable whose value is set to True produces

date__DES_Simulation_Result_06_TaskList.txt

result file, which contains an abbreviated list of TDES_TASK objects in the simulation model after the simulation is complete.

If the Boolean variable is set to False, no such list is generated!

```
Branch.Print_Model_DESTaskList_bool = True
```

The Boolean variable whose value is set to True produces

date__DES_Simulation_Result_05_Sinked_EntityList.txt

result file, which contains an abbreviated list of TDES_ENTITY objects that left the simulation model after the simulation was completed.

If the Boolean variable is set to False, no such list is generated!

```
Branch.Print_Sinked_EntityList_short_bool = False
```

The Boolean variable whose value is set to True produces

date__DES_Simulation_Result_05_Sinked_EntityList.txt

result file, which contains a complete list of TDES_ENTITY objects that left the simulation model after the simulation was completed.

If the Boolean variable is set to False, no such list is generated!

```
Branch.Print_Sinked_EntityList_bool = False
```

4.4.2 DES Python sample program block diagram

The next simple DES model shown in the block diagram is a queuing model.

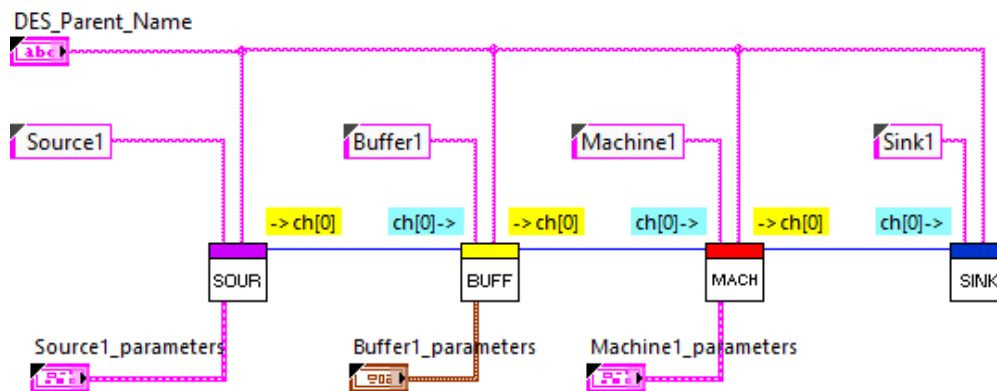


Figure 4.4.2.87 Simple queuing model block diagram in LabVIEW graphical editor.

The meaning of the icons in the Figure is:



Source (**TSOURCE**) is a DES object.



is the Buffer (**TBUFFER**) DES object.



the Machine (**TMACHINE**) DES object.



the Sink (**TSINK**) DES object.

ch[0]->

is the output of the DES object through its output channel 0.

-> ch[0]

meaning is the input of the DES object through its input channel 0.

The DES Python model program created based on the block diagram above, which is called User_Manual_01.py.

Important rules to create DESBranch_DESConnectionList:

- Only one connection (**TDES CONNECTION**) can start from each output channel (**TDES CHANNEL**).
- Only one connection (**TDES CONNECTION**) can be received in each input channel (**TDES CHANNEL**).

4.4.3 DES Python sample program code

In the program, the definition of DES objects (**TDES_OBJECT**) is highlighted in bold red letters, while relationships (**TDES_CONNECTION**) are indicated in bold blue letters.

The lines beginning with # are annotations that contain explanatory text about each comment of the program.

Taking all these into account, building objects and relationships of the planned DES simulation model can create the following Python program.

Template, you can use this program to create an arbitrarily complex simulation model.

User_Manual_01.py

```
#####
#####
#####
#####
# Libraries required to run the program
import sys
import time

from TDES_TYPES import *
from TDES_CHANNEL import *
from TDES_CONNECTION import *
from TDES_TASK import *
from TDES_ENTITY import *
from TDES_ENTITYLIST import *
from TDES_OBJECT import *
from TDES_BRANCH import *

#####
#####
#####
#####
#####
#####
#####
#####
#####
# Define the model object
Class TUM_Model_01:

    #&&&&
    # 2020. 10. 22. 17:39:27

    def __init__(
        Self
        Model_Name_str,
    ):

        Branch =TDES_BRANCH(Model_Name_str)
        Self. Memo_str = ''
```

```

#####
#####
#START OF TDES_OBJECT TYPE DECLARATION

#
#####
#####
# Name of DES_OBJECT_2 = 'Buffer1'
#
#####
#####
# Define the TDES_OBJECT
    DES_OBJECT_2 = TDES_OBJECT(
        TBUFFER, #Object_Type
        'Buffer1', #Object_Name_str
        6, #Inputs
        6, #Outputs
    )

# Set TDES_OBJECT attributes

DES_OBJECT_2.DESObject_InputChannel_Index_Selection_Strategy.Set_Item_str_to('TSelection_Random_Selected_Index')
    DES_OBJECT_2.DESObject_InputChannel_Index = 0

DES_OBJECT_2.DESObject_OutputChannel_Index_Selection_Strategy.Set_Item_str_to('TSelection_Random_Selected_Index')
    DES_OBJECT_2.DESObject_OutputChannel_Index = 0

DES_OBJECT_2.BUFFER_Type_Of_Queue.Set_Item_str_to('TQueue_First_In_First_Out')

    DES_OBJECT_2.DESObject_Capacity = 10

```

```

#
+++++
+++++
# Name of DES_OBJECT_3 = 'Machine1'
#
+++++
+++++
# Define the TDES OBJECT
    DES_OBJECT_3 = TDES_OBJECT(
        TMACHINE, #Object_Type
        'Machine1', #Object_Name_str
        6, #Inputs
        6, #Outputs
    )

# Set TDES_OBJECT attributes

DES_OBJECT_3.DESObject_InputChannel_Index_Selection_Strategy.Set_Item_str_to('TSelection_Random_Selected_Index')
    DES_OBJECT_3.DESObject_InputChannel_Index = 0

DES_OBJECT_3.DESObject_OutputChannel_Index_Selection_Strategy.Set_Item_str_to('TSelection_Random_Selected_Index')
    DES_OBJECT_3.DESObject_OutputChannel_Index = 0

    DES_OBJECT_3.MACHINE_Minimum_Of_Time = 1.000
    DES_OBJECT_3.MACHINE_Usual_Of_Time = 2.000
    DES_OBJECT_3.MACHINE_Maximum_Of_Time = 3.000
    DES_OBJECT_3.MACHINE_Deviation_Of_Time = 1.000
    DES_OBJECT_3.MACHINE_Mean_Of_Time = 1.000
    DES_OBJECT_3.MACHINE_Constant_Value_Of_Time = 1.000

DES_OBJECT_3.MACHINE_Distribution.Set_Item_str_to('TDistribution_Constant_Value')
    """
TDES_Distribution =(
    'TDistribution_Constant_Value', #=0
    'TDistribution_Exponential_Mean', #=1
    'TDistribution_Normal_Mean_Deviation', #=2
    'TDistribution_Triangle_Minimum_Usual_Maximum', #=3
    'TDistribution_Uniform_Minimum_Maximum' #=4
)
    """
    DES_OBJECT_3.DESObject_Capacity = 1

```

```

#
+++++
# Name of DES_OBJECT_4 = 'Sink1'
#
+++++
# Define the TDES OBJECT
    DES_OBJECT_4 = TDES_OBJECT(
        TSINK, #Object_Type
        'Sink1', #Object_Name_str
        6, #Inputs
        0.#Outputs
    )

#
+++++
# Name of DES_OBJECT_1 = 'Source1'
#
+++++
# Define the TDES OBJECT
    DES_OBJECT_1 = TDES_OBJECT(
        TSOURCE, #Object_Type
        'Source1', #Object_Name_str
        0.#Inputs
        6, #Outputs
    )

# Set TDES_OBJECT attributes

DES_OBJECT_1.DESObject_OutputChannel_Index_Selection_Strategy.Set_Item_s
tr_to('TSelection_Random_Selected_Index')
    DES_OBJECT_1.DESObject_OutputChannel_Index = 0

    DES_OBJECT_1.SOURCE_Minimum_Of_Time = 1.000
    DES_OBJECT_1.SOURCE_Usual_Of_Time = 2.000
    DES_OBJECT_1.SOURCE_Maximum_Of_Time = 3.000
    DES_OBJECT_1.SOURCE_Deviation_Of_Time = 1.000
    DES_OBJECT_1.SOURCE_Mean_Of_Time = 1.000
    DES_OBJECT_1.SOURCE_Constant_Value_Of_Time = 1.000

DES_OBJECT_1.SOURCE_Distribution.Set_Item_str_to('TDistribution_Constant
_Value')
    """
TDES_Distribution =(
    'TDistribution_Constant_Value', #=0
    'TDistribution_Exponential_Mean', #=1
    'TDistribution_Normal_Mean_Deviation', #=2
    'TDistribution_Triangle_Minimum_Usual_Maximum', #=3
    'TDistribution_Uniform_Minimum_Maximum' #=4
)
    """
    DES_OBJECT_1.SOURCE_Created_Entity.DESEntity_Name_str =
'Created_Entity_Name'
    DES_OBJECT_1.SOURCE_First_Time_of_Entity_Creation = 0.000

```

```
DES_OBJECT_1.SOURCE_Maximum_Batch_Size=2000000000  
  
DES_OBJECT_1.DESObject_Capacity = 1  
  
#  
&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&  
&&& &&  
# Insert of DES_OBJECTs into DESObjectList of DES_BRANCH  
#  
+++++++  
++++++  
# Place TDES_OBJECT objects in . DESBranch_DESObjectList  
  
        Branch.DESEnvironment_Insert_DESObject_Into_DESObjectList  
(DES_OBJECT_2) # Buffer1  
        Branch.DESEnvironment_Insert_DESObject_Into_DESObjectList  
(DES_OBJECT_3) # Machine1  
        Branch.DESEnvironment_Insert_DESObject_Into_DESObjectList (  
DES_OBJECT_4) # Sink1  
        Branch.DESEnvironment_Insert_DESObject_Into_DESObjectList  
(DES_OBJECT_1) # Source1  
  
#  
+++++++  
++++++  
  
#  
#####  
#####  
# START OF TDES_CONNECTIONs DECLARATION  
  
# DESEnvironment_ConnectionList [0]  
#  
+++++++  
++++++  
# Define the TDES_CONNECTION  
    DES_Connection = TDES_CONNECTION()  
  
# Set TDES_CONNECTION attributes  
  
DESEnvironment.Connection_DESEnvironment_Name_OUT_str=Branch.DESEnvironment_Nam  
e_str  
    DES_Connection.DESEnvironment_NAME_OUT_str = 'Source1'  
    DES_Connection.DESEnvironment_Channel_Index_OUT = 0  
  
    DES_Connection.DESEnvironment_Name_IN_str =  
Branch.DESEnvironment_Name_str  
    DES_Connection.DESEnvironment_NAME_IN_str = 'Buffer1'  
    DES_Connection.DESEnvironment_Channel_Index_IN = 0  
  
    DES_Connection.DESEnvironment_Enabled_bool = True  
  
    DES_Connection.DESEnvironment TRACED bool =False
```

Place the TDES_CONNECTION object in . DESBranch_DESConnectionList

```
Branch.DESBranch_Insert_Connection_Into_DESConnectionList(DESS_Connection
, )
#
+++++
```

```
# DESBranch_DESConnectionList [1]
```

```
#
+++++
```

Define the TDES_CONNECTION

```
DESS_Connection = TDES_CONNECTION()
```

```
# Set TDES_CONNECTION attributes
```

```
DESS_Connection.DESConnection_DESBranch_Name_OUT_str=Branch.DESBranch_Nam
e_str
```

```
DESS_Connection.DESConnection_DESObject_Name_OUT_str = 'Buffer1'
DESS_Connection.DESConnection_DESObject_Channel_Index_OUT = 0
```

```
DESS_Connection.DESConnection_DESBranch_Name_IN_str =
Branch.DESBranch_Name_str
```

```
DESS_Connection.DESConnection_DESObject_Name_IN_str = 'Machine1'
DESS_Connection.DESConnection_DESObject_Channel_Index_IN = 0
```

```
DESS_Connection.DESConnection_Enabled_bool = True
```

```
DESS_Connection.DESConnection_TRACED_bool = False
```

Place the TDES_CONNECTION object in . DESBranch_DESConnectionList

```
Branch.DESBranch_Insert_Connection_Into_DESConnectionList(DESS_Connection
, )
#
+++++
```

```
# DESBranch_DESConnectionList [2]
```

```
#
+++++
```

Define the TDES_CONNECTION

```
DESS_Connection = TDES_CONNECTION()
```

```
# Set TDES_CONNECTION attributes
```

```
DESS_Connection.DESConnection_DESBranch_Name_OUT_str=Branch.DESBranch_Nam
e_str
```

```
DESS_Connection.DESConnection_DESObject_Name_OUT_str='Machine1'
DESS_Connection.DESConnection_DESObject_Channel_Index_OUT = 0
```

```
DESS_Connection.DESConnection_DESBranch_Name_IN_str =
Branch.DESBranch_Name_str
```

```
DESS_Connection.DESConnection_DESObject_Name_IN_str = 'Sink1'
```

```
DES_Connection.DESConnection_DESObject_Channel_Index_IN = 0

DES_Connection.DESConnection_Enabled_bool = True

DES_Connection.DESConnection_TRACED_bool = False

# Place the TDES_CONNECTION object in . DESBranch_DESConnectionList

Branch.DESBranch_Insert_Connection_Into_DESConnectionList(DES_Connection
,)
#
+++++
+++++

# End of Class User_Manual_Model_01

# oooooo
# oooooo
# oooooo
# oooooo
```


5. DES models

The models created in the Discrete Event Simulator have a simple structure and all documentation files created during/after running are presented in the sample examples. Of course, larger models can be created than the examples shown, where the number of object definitions and relationships is proportional to the number of DES objects.

Due to the simplicity of each of the models, it can be made manually programmatically, but for a larger number of DES objects, I recommend using a graphics editing program.

A graphical editing program is available for creating models, which was created in LabVIEW 2016.

The result files for each model contain the following data:

- List of Python programs for the model, which is an object definition (Python program list).
- After running the program, a detailed list of the contents of DES object attributes (**TDES_OBJECT list**).
- After the program finishes running, a detailed list of attributes of entities (**TDES_ENTITY list**) remained in the model.
- After the program finishes running, a detailed list of attributes of entities that exited the model (**TDES_SINKED_ENTITY list**).
- After the program finishes running, a list of unexecuted **TDES_TASK** instructions (**TDES_TASK list**) remained in the model.
- After the program is complete, the DES objects in the model for which (1 < Capacity) is a histogram of the use of certain Entity Storage number compartments during the simulation (TBUFFER occupancy list).

While the program is running and after the program is complete, a list of results is created that includes the following information:

- A list of DES objects in the model with attributes set in the model's Python program list.
 - List of initial tasks (**DESBranch_TaskList**) for the model
 - While the model simulation program is running:
 - the simulation date,
 - real time,
 - the number of simulation cycles,
 - the number of Entities in the model,
 - count of Entities exited the model.

After the program runs:

- A simplified list of Entities in the model,
 - A simplified list of the state of DES objects in the model,
 - DES objects included in the model:
 - the contents of the current Entity Container,
 - the average content of the Entity Container,
 - the number of Entities logged into the DES object,
 - the number of Entities that exited the DES object,
 - the average residence time of entities in the DES object
 - the percentage of simulation time spent by DES objects in different working states,
 - administrative data on the number of calls to DES objects and calls to the Entity Move procedure,
 - Real time(s) of the model program.

5.1 DES model 01

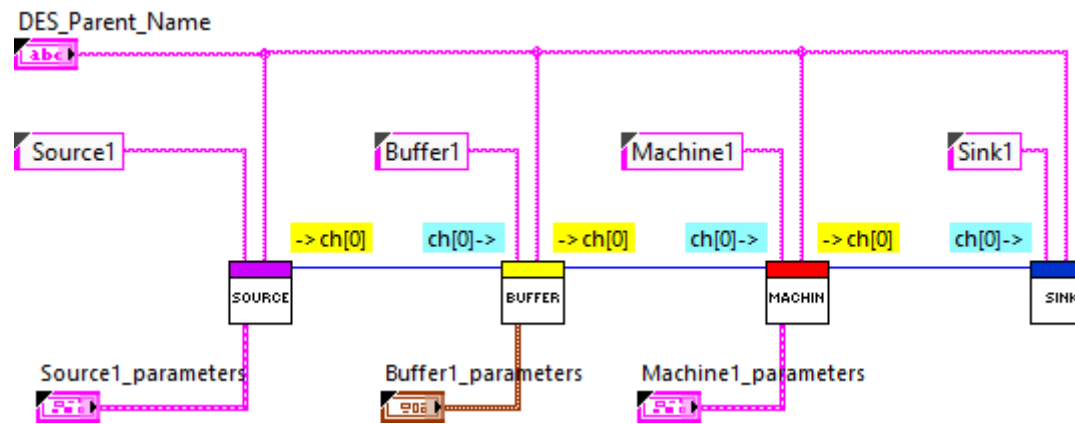


Figure 5.1.88 MODEL_01 block diagram of LabVIEW graphical editor Program

MODEL 01 (.mp4 films)

Icons in the Figure Report:



Source (**TSOURCE**) is a DES object.



is the Buffer (**TBUFFER**) DES object.



the Machine (**TMACHINE**) DES object.



the Sink (**TSINK**) DES object.

ch[0]->

is the output of the DES object through its output channel 0.

-> ch[0]

meaning is the input of the DES object through its input channel 0.

The simulation model is a simple Source-Buffer-Machine (**TSOURCE TBUFFER TMACHINE TSINK**) *queuing system*.

The Source (**TSOURCE**) DES object emits Entities with a time increment of 1 second (Figure 4.1.2).

The Machine (**TMACHINE**) DES object delays the Entities arriving at its input channel by 1 second (Figure 4.1.4).

Thus, during a simulation period of 1 minute, 60 Entities exit the model in the Sink (**TSINK**) DES object.

Source1_parameters

SOURCE_Name_Of_Produced_Entity_str Created_Entity_Name	SOURCE_Distribution TDistribution_Constant_Value	SOURCE_Maximum_Of_Time 0:00:00:03.000
SOURCE_First_Time_of_Entity_Creation 0:00:00:00.000 hour:minute:second.xxx	SOURCE_Constant_Value_Of_Time 0:00:00:01.000 hour:minute:second.xxx	SOURCE_Mean_Of_Time 0:00:00:01.000
SOURCE_Maximum_Batch_Size 2000000000	SOURCE_Deviation_Of_Time 0:00:00:01.000 hour:minute:second.xxx	SOURCE_Usual_Of_Time 0:00:00:02.000
Capacity 1	OutputChannel_Index_Selection_Strategy TSelection_Random_Selected_Index	SOURCE_Minimum_Of_Time 0:00:00:01.000 hour:minute:second.xxx
	OutputChannel_Index 0	

Figure 5.1.89 MODEL_01/Source1 parameters

Buffer1_parameters

BUFFER_Type_Of_Queue TQueue_First_In_First_Out	InputChannel_Index 0	InputChannel_Index_Selection_Strategy TSelection_Random_Selected_Index
Capacity 10	OutputChannel_Index 0	OutputChannel_Index_Selection_Strategy TSelection_Random_Selected_Index

Figure 5.1.90 MODEL_01/Buffer1 parameters

Machine1_parameters

MACHINE_Distribution	MACHINE_ConstantValue_Of_Time	MACHINE_Maximum_Of_Time
TDistribution_Constant_Value	0:00:00:01.000	0:00:00:03.000
	MACHINE_Mean_Of_Time	MACHINE_Usual_Of_Time
	0:00:00:01.000	0:00:00:02.000
Capacity	MACHINE_Deviation_Of_Time	MACHINE_Minimum_Of_Time
1	0:00:00:01.000	0:00:00:01.000
	hour:minute:second.xxx	hour:minute:second.xxx
InputChannel_Index_Selection_Strategy	OutputChannel_Index_Selection_Strategy	
TSelection_Random_Selected_Index	TSelection_Random_Selected_Index	
InputChannel_Index	OutputChannel_Index	
0	0	

Figure 5.1.91 MODEL_01/Machine1 parameters

5.1.1 DES_Modell_01 Python Program list

```
#####
#####
import sys
import time
from TDES_TYPES import *
from TDES_CHANNEL import *
from TDES_CONNECTION import *
from TDES_TASK import *
from TDES_ENTITY import *
from TDES_ENTITYLIST import *
from TDES_OBJECT import *
from TDES_BRANCH import *

#####
#####
#####
#####

Class TUser_Manual_01:

    #&&&&
    # 2020. 10. 22. 17:39:27

    def __init__(
        Self
        Model_Name_str,
    ):

        Branch =TDES_BRANCH(Model_Name_str)
        Self. Branch = Branch
        Self. Memo_str = ''
```

```

#####
#START OF TYPE DECLARATION
#Discrete Event Simulator

#####
#Initiate Branches
    Memol_str = ''
    Title_str = 'Initiate_DES_Branch:'
    Text_str = DES_Create_Text_Chain_str(
        flax(Title_str),
        '='
    )
    Memol_str = Memol_str + Title_str + CRLF
    Memol_str = Memol_str + Text_str + CRLF

    #Branch = TDES_BRANCH(Branch_Name_str)
    Memol_str = Memol_str + 'Name_Of_Branch = ' + Branch.DESBranch_Name_str + CRLF

    Branch.DESBranch_Model_Name_str = 'DES_LabVIEW_Created_Model.py'
    Memol_str = Memol_str + 'Name_Of_Model = ' + Branch.DESBranch_Model_Name_str + CRLF


# #####
# Name of DES_OBJECT_2 = 'Buffer1'
# #####
    DES_OBJECT_2 = TDES_OBJECT(
        TBUFFER, #Object_Type
        'Buffer1', #Object_Name_str
        6, #Inputs
        6, #Outputs
    )

```

```
DES_OBJECT_2.DESObject_InputChannel_Index_Selection_Strategy.Set_Item_str_to('TSelection_Random_Selected_Index')
    DES_OBJECT_2.DESObject_InputChannel_Index = 0

DES_OBJECT_2.DESObject_OutputChannel_Index_Selection_Strategy.Set_Item_str_to('TSelection_Random_Selected_Index')
    DES_OBJECT_2.DESObject_OutputChannel_Index = 0

    DES_OBJECT_2.BUFFER_Type_Of_Queue.Set_Item_str_to('TQueue_First_In_First_Out')

    DES_OBJECT_2.DESObject_Capacity = 10

# ++++++
# Name of DES_OBJECT_3 = 'Machine1'
# ++++++
    DES_OBJECT_3 = TDES_OBJECT(
        TMACHINE, #Object_Type
        'Machine1', #Object_Name_str
        6, #Inputs
        6, #Outputs
    )

DES_OBJECT_3.DESObject_InputChannel_Index_Selection_Strategy.Set_Item_str_to('TSelection_Random_Selected_Index')
    DES_OBJECT_3.DESObject_InputChannel_Index = 0

DES_OBJECT_3.DESObject_OutputChannel_Index_Selection_Strategy.Set_Item_str_to('TSelection_Random_Selected_Index')
    DES_OBJECT_3.DESObject_OutputChannel_Index = 0

    DES_OBJECT_3.MACHINE_Minimum_Of_Time = 1.000
    DES_OBJECT_3.MACHINE_Usual_Of_Time = 2.000
    DES_OBJECT_3.MACHINE_Maximum_Of_Time = 3.000
    DES_OBJECT_3.MACHINE_Deviation_Of_Time = 1.000
    DES_OBJECT_3.MACHINE_Mean_Of_Time = 1.000
    DES_OBJECT_3.MACHINE_Constant_Value_Of_Time = 1.000
```



```

DES_OBJECT_3.MACHINE_Distribution.Set_Item_str_to('TDistribution_Constant_Value')
"""
TDES_Distribution =(
    'TDistribution_Constant_Value', #=0
    'TDistribution_Exponential_Mean', #=1
    'TDistribution_Normal_Mean_Deviation', #=2
    'TDistribution_Triangle_Minimum_Usual_Maximum', #=3
    'TDistribution_Uniform_Minimum_Maximum' #=4
)
"""
DES_OBJECT_3.DESObject_Capacity = 1

# ++++++
# Name of DES_OBJECT_4 = 'Sink1'
# ++++++
DES_OBJECT_4 = TDES_OBJECT(
    TSINK, #Object_Type
    'Sink1', #Object_Name_str
    6, #Inputs
    0.#Outputs
)

# ++++++
# Name of DES_OBJECT_1 = 'Source1'
# ++++++
DES_OBJECT_1 = TDES_OBJECT(
    TSOURCE, #Object_Type
    'Source1', #Object_Name_str
    0.#Inputs
    6, #Outputs
)

DES_OBJECT_1.DESObject_OutputChannel_Index_Selection_Strategy.Set_Item_str_to('TSelection_Random_Selected_Index')

```

```

DES_OBJECT_1.DESObject_OutputChannel_Index = 0

DES_OBJECT_1.SOURCE_Minimum_Of_Time = 1.000
DES_OBJECT_1.SOURCE_Usual_Of_Time = 2.000
DES_OBJECT_1.SOURCE_Maximum_Of_Time = 3.000
DES_OBJECT_1.SOURCE_Deviation_Of_Time = 1.000
DES_OBJECT_1.SOURCE_Mean_Of_Time = 1.000
DES_OBJECT_1.SOURCE_Constant_Value_Of_Time = 1.000

DES_OBJECT_1.SOURCE_Distribution.Set_Item_str_to('TDistribution_Constant_Value')
"""
TDES_Distribution =(
'TDistribution_Constant_Value', #=0
'TDistribution_Exponential_Mean', #=1
'TDistribution_Normal_Mean_Deviation', #=2
'TDistribution_Triangle_Minimum_Usual_Maximum', #=3
'TDistribution_Uniform_Minimum_Maximum' #=4
)
"""
DES_OBJECT_1.SOURCE_Created_Entity.DESEntity_Name_str = 'Created_Entity_Name'
DES_OBJECT_1.SOURCE_First_Time_of_Entity_Creation = 0.000

DES_OBJECT_1.SOURCE_Maximum_Batch_Size=20000000000

DES_OBJECT_1.DESObject_Capacity = 1

#+++++
#Insert of DES_OBJECT into DESObjectList of DES_BRANCH
Memol_str =Memol_str + CRLF + CRLF

Title_str ='Insert_DES_Object_Into_DES_ObjectList:'
Text_str =DES_Create_Text_Chain_str(
    flax(Title_str),
    '='
)
Memol_str =Memol_str + Title_str + CRLF + Text_str + CRLF

```

```
#+++++  
  
# &&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&  
# Insert of DES_OBJECTs into DESObjectList of DES_BRANCH  
  
# +++++  
  
    Branch.DESBranch_Insert_DESObject_Into_DESObjectList (DES_OBJECT_2) # Buffer1  
    Branch.DESBranch_Insert_DESObject_Into_DESObjectList (DES_OBJECT_3) # Machine1  
    Branch.DESBranch_Insert_DESObject_Into_DESObjectList ( DES_OBJECT_4) # Sink1  
    Branch.DESBranch_Insert_DESObject_Into_DESObjectList (DES_OBJECT_1) # Source1  
# +++++  
  
#####  
#Insert of DES_CONNECTIONS into DESConnectionList of DES_BRANCH  
    Mem0_str =Mem0_str + CRLF + CRLF  
    Title_str ='Insert_Des_Connection_To_DESConnectionList:'  
    Text_str =DES_Create_Text_Chain_str(  
        lin(Title_str), #unsigned int n,  
        '=' #string text  
    )  
    Mem0_str =Mem0_str + Title_str + CRLF + Text_str + CRLF  
#####  
  
#####  
# Insert of DES_CONNECTIONs into DESConnectionList of DES_BRANCH  
  
# DESBranch DESConnectionList [0]
```

```
# ++++++
DES_Connection = TDES_CONNECTION()
DES_Connection.DESConnection_DESBranch_Name_OUT_str=Branch.DESBranch_Name_str
DES_Connection.DESConnection_DESObject_Name_OUT_str = 'Source1'
DES_Connection.DESConnection_DESObject_Channel_Index_OUT = 0

DES_Connection.DESConnection_DESBranch_Name_IN_str = Branch.DESBranch_Name_str
DES_Connection.DESConnection_DESObject_Name_IN_str = 'Buffer1'
DES_Connection.DESConnection_DESObject_Channel_Index_IN = 0

DES_Connection.DESConnection_Enabled_bool = True

DES_Connection.DESConnection_TRACED_bool = False

Branch.DESBranch_Insert_Connection_Into_DESConnectionList(DES_Connection,)
# ++++++

# DESBranch_DESConnectionList [1]
# ++++++
DES_Connection = TDES_CONNECTION()
DES_Connection.DESConnection_DESBranch_Name_OUT_str=Branch.DESBranch_Name_str
DES_Connection.DESConnection_DESObject_Name_OUT_str = 'Buffer1'
DES_Connection.DESConnection_DESObject_Channel_Index_OUT = 0

DES_Connection.DESConnection_DESBranch_Name_IN_str = Branch.DESBranch_Name_str
DES_Connection.DESConnection_DESObject_Name_IN_str = 'Machine1'
DES_Connection.DESConnection_DESObject_Channel_Index_IN = 0

DES_Connection.DESConnection_Enabled_bool = True

DES_Connection.DESConnection_TRACED_bool = False

Branch.DESBranch_Insert_Connection_Into_DESConnectionList(DES_Connection,)
# ++++++

# DESBranch_DESConnectionList [2]
```

[illegible]

5.1.2 DES_Modell_01 TDES_OBJECT list

Local time :Fri Oct 23 08:23:06 2020
 Model_Name : UM_Model_01

UM_Model_01.Print ObjectList Short:

=====

Number of DESObjects = 4

GTime_Now [DDD:HH:MM:SS.XXX] = 0:00:01:01.000

=====

=====

UM_Model_01.DESObjectList[i]	DESObject_Name	DESObject_Type	State	Last_Calculation_Time
DESObject_Content				

=====

=====

=====

UM_Model_01.DESObjectList[0]	Buffer1	TBUFFER	TIdle	0:00:01:00.000
>x,x,x,x,x,x>-[x]->x,x,x,x,x,x>	(Buffer is EMPTY	Capacity = 10)		
UM_Model_01.DESObjectList[1]	Machine1	TMACHINE	TBusy	0:00:01:00.000
>x,x,x,x,x,x>-[#83]->x,x,x,x,x,x>	(Capacity = 1)			
UM_Model_01.DESObjectList[2]	Sink1	TSINK	TIdle	0:00:01:00.000
>x,x,x,x,x,x>-[x]->nil>				
UM_Model_01.DESObjectList[3]	Source1	TSOURCE	TIdle	0:00:01:01.000
>nil>-[x]->#84,x,x,x,x,x>	(Capacity = 1)			

UM_Model_01.Print_DESObjectList:

=====

Number of DESObjects = 4

GTime_Now [DDD:HH:MM:SS.XXX] = 0:00:01:01.000

```
#####
#####
UM_Model_01.DESBranch_DESObjectList[    0]

*****
TBUFFER_start_TBUFFER_start_TBUFFER_start_TBUFFER_start_TBUFFER_start_TBUFFER_
+++++++

UM_Model_01.Buffer1.BUFFER_Type_Of_Queue = TQueue_First_In_First_Out
UM_Model_01.Buffer1.BUFFER_Maximum_Content =0

UM_Model_01.Buffer1.BUFFER_Last_Calculation_Time =  0:00:01:00.000
.....

UM_Model_01.Buffer1.DESObject_Owner_class =<TDES_BRANCH.TDES_BRANCH object at 0x000002149EC76EB0>    (UM_Model_01)

UM_Model_01.Buffer1.DESObject_Name_str =Buffer1
UM_Model_01.Buffer1.DESObject_ID_Number =12
UM_Model_01.Buffer1.DESObject_Type =TBUFFER

UM_Model_01.Buffer1.DESObject_Priority_To_DESEntity_From_DESObject =0
UM_Model_01.Buffer1.DESBranch_Name_str =UM_Model_01

UM_Model_01.Buffer1.DESObject_Commanded_State_In_Previous_Step =TCommanded_Enabled_State
UM_Model_01.Buffer1.DESObject_Commanded_State =TCommanded_Enabled_State

UM_Model_01.Buffer1.DESObject_Work_State =TIdle
UM_Model_01.Buffer1.DESObject_Work_State_In_Previous_Step =TIdle
UM_Model_01.Buffer1.DESObject_Work_State_Before_Fail_Or_Pause =TIdle

UM_Model_01.Buffer1.Time_Percent_In_Statuses[    TIdle] =100.000
UM_Model_01.Buffer1.Time_Percent_In_Statuses[    TBusy] =  0.000
UM_Model_01.Buffer1.Time_Percent_In_Statuses[TBlocked] =  0.000
UM_Model_01.Buffer1.Time_Percent_In_Statuses[ TFailed] =  0.000
UM_Model_01.Buffer1.Time_Percent_In_Statuses[ TPaused] =  0.000
```

```

UM_Model_01.Buffer1.System_Attributes[ i] = Name
Value
UM_Model_01.Buffer1.System_Attributes[ 0] = WORKED_Entity_Sample_Number      61
UM_Model_01.Buffer1.System_Attributes[ 1] = WORKED_Entity_Sample_Summa      0.0
UM_Model_01.Buffer1.System_Attributes[ 2] = WORKED_Entity_Average_Staying_Time_in_DESObject
0:00:00:00.000
UM_Model_01.Buffer1.System_Attributes[ 3] = WORKED_Entity_Maximal_Number_in_DESObject      0
[entities]
UM_Model_01.Buffer1.System_Attributes[ 4] = WORKED_Entity_Queue_Sample_Number      61
UM_Model_01.Buffer1.System_Attributes[ 5] = WORKED_Entity_Number_in_Queue_Summa      0.0
UM_Model_01.Buffer1.System_Attributes[ 6] = WORKED_Entity_Average_Number_in_DESObject
0.000 [entities]
UM_Model_01.Buffer1.System_Attributes[ 7] = WORKED_Entity_Through_Output_Rate at Output_Channel[0]
1.0000000 [entity/seconds]
UM_Model_01.Buffer1.System_Attributes[ 8] = WORKED_Entity_Produce_Time at Output_Channel[0]
1.0000000 [seconds/entity]

UM_Model_01.Buffer1.First_Calculation? =False

UM_Model_01.Buffer1.InputChannel_Index_Selection_Strategy =TSelection_Random_Selected_Index
UM_Model_01.Buffer1.InputChannel_Index =0

UM_Model_01.Buffer1.Number_Of_InputChannels =6

UM_Model_01.Buffer1.Input [ 0].Data =#Empty
UM_Model_01.Buffer1.Input [ 0].Channel_Is_Enabled =True
UM_Model_01.Buffer1.Input [ 0].Channel_Is_Connected =True    (#_of_Entities= 61)

UM_Model_01.Buffer1.Input [ 1].Data =#Empty
UM_Model_01.Buffer1.Input [ 1].Channel_Is_Enabled =True
UM_Model_01.Buffer1.Input [ 1].Channel_Is_Connected =False    (#_of_Entities= 0)

UM_Model_01.Buffer1.Input [ 2].Data =#Empty
UM_Model_01.Buffer1.Input [ 2].Channel_Is_Enabled =True
UM_Model_01.Buffer1.Input [ 2].Channel_Is_Connected =False    (#_of_Entities= 0)

UM_Model_01.Buffer1.Input [ 3].Data =#Empty
UM_Model_01.Buffer1.Input [ 3].Channel_Is_Enabled =True

```



```
UM_Model_01.Buffer1.Input [ 3].Channel_Is_Connected =False    (#_of_Entities= 0)

UM_Model_01.Buffer1.Input [ 4].Data =#Empty
UM_Model_01.Buffer1.Input [ 4].Channel_Is_Enabled =True
UM_Model_01.Buffer1.Input [ 4].Channel_Is_Connected =False    (#_of_Entities= 0)

UM_Model_01.Buffer1.Input [ 5].Data =#Empty
UM_Model_01.Buffer1.Input [ 5].Channel_Is_Enabled =True
UM_Model_01.Buffer1.Input [ 5].Channel_Is_Connected =False    (#_of_Entities= 0)

UM_Model_01.Buffer1.Capacity =10
UM_Model_01.Buffer1.Number_Of_Content_Entities =0

UM_Model_01.Buffer1.OutputChannel_Index_Selection_Strategy =TSelection_Random_Selected_Index
UM_Model_01.Buffer1.OutputChannel_Index =0

UM_Model_01.Buffer1.Number_Of_OutputChannels =6

UM_Model_01.Buffer1.Output [ 0].Data =#Empty
UM_Model_01.Buffer1.Output [ 0].Channel_Is_Enabled =True
UM_Model_01.Buffer1.Output [ 0].Channel_Is_Connected =True    (#_of_Entities= 61)

UM_Model_01.Buffer1.Output [ 1].Data =#Empty
UM_Model_01.Buffer1.Output [ 1].Channel_Is_Enabled =True
UM_Model_01.Buffer1.Output [ 1].Channel_Is_Connected =False    (#_of_Entities= 0)

UM_Model_01.Buffer1.Output [ 2].Data =#Empty
UM_Model_01.Buffer1.Output [ 2].Channel_Is_Enabled =True
UM_Model_01.Buffer1.Output [ 2].Channel_Is_Connected =False    (#_of_Entities= 0)

UM_Model_01.Buffer1.Output [ 3].Data =#Empty
UM_Model_01.Buffer1.Output [ 3].Channel_Is_Enabled =True
UM_Model_01.Buffer1.Output [ 3].Channel_Is_Connected =False    (#_of_Entities= 0)

UM_Model_01.Buffer1.Output [ 4].Data =#Empty
UM_Model_01.Buffer1.Output [ 4].Channel_Is_Enabled =True
UM_Model_01.Buffer1.Output [ 4].Channel_Is_Connected =False    (#_of_Entities= 0)

UM_Model_01.Buffer1.Output [ 5].Data =#Empty
```

```
UM_Model_01.Buffer1.Output [ 5].Channel_Is_Enabled =True
UM_Model_01.Buffer1.Output [ 5].Channel_Is_Connected =False    (#_of_Entities= 0)

*****
TBUFFER_end_TBUFFER_end_TBUFFER_end_TBUFFER_end_TBUFFER_end_TBUFFER_end_TBUFFER_
-----

#####
#####
UM_Model_01.DESBranch_DESObjectList[    1]

*****
TMACHINE_start_TMACHINE_start_TMACHINE_start_TMACHINE_start_TMACHINE_start_TMACH
+++++++

UM_Model_01.Machine1.MACHINE_Time_Of_Next_Launching =  0:00:01:01.000
UM_Model_01.Machine1.MACHINE_Time_Step =  0:00:00:01.000

UM_Model_01.Machine1.MACHINE_Distribution =TDistribution_Constant_Value

UM_Model_01.Machine1.MACHINE_Constant_Value_Of_Time =  0:00:00:01.000
UM_Model_01.Machine1.MACHINE_Mean_Of_Time =  0:00:00:01.000
UM_Model_01.Machine1.MACHINE_Deviation_Of_Time =  0:00:00:01.000
UM_Model_01.Machine1.MACHINE_Maximum_Of_Time =  0:00:00:03.000
UM_Model_01.Machine1.MACHINE_Usual_Of_Time =  0:00:00:02.000
UM_Model_01.Machine1.MACHINE_Minimum_Of_Time =  0:00:00:01.000

UM_Model_01.Machine1.MACHINE_Utilization =100.000 [%]

UM_Model_01.Machine1.MACHINE_Last_Calculation_Time =  0:00:01:00.000
.....

UM_Model_01.Machine1.DESObject_Owner_class =<TDES_BRANCH.TDES_BRANCH object at 0x000002149EC76EB0>
(UM_Model_01)
```

```

UM_Model_01.Machine1.DESObject_Name_str =Machine1
UM_Model_01.Machine1.DESObject_ID_Number =13
UM_Model_01.Machine1.DESObject_Type =TMACHINE

UM_Model_01.Machine1.DESObject_Priority_To_DESEntity_From_DESObject =0
UM_Model_01.Machine1.DESBranch_Name_str =UM_Model_01

UM_Model_01.Machine1.DESObject_Commanded_State_In_Previous_Step =TCommanded_Enabled_State
UM_Model_01.Machine1.DESObject_Commanded_State =TCommanded_Enabled_State

UM_Model_01.Machine1.DESObject_Work_State =TBusy
UM_Model_01.Machine1.DESObject_Work_State_In_Previous_Step =TBusy
UM_Model_01.Machine1.DESObject_Work_State_Before_Fail_Or_Pause =TBusy

UM_Model_01.Machine1.Time_Percent_In_Statuses[  TIdle] =  0.000
UM_Model_01.Machine1.Time_Percent_In_Statuses[  TBusy] =100.000
UM_Model_01.Machine1.Time_Percent_In_Statuses[TBlocked] =  0.000
UM_Model_01.Machine1.Time_Percent_In_Statuses[ TFailed] =  0.000
UM_Model_01.Machine1.Time_Percent_In_Statuses[ TPaused] =  0.000

UM_Model_01.Machine1.System_Attributes[  i] = Name
Value
UM_Model_01.Machine1.System_Attributes[  0] = WORKED_Entity_Sample_Number
UM_Model_01.Machine1.System_Attributes[  1] = WORKED_Entity_Sample_Summa
60.0
UM_Model_01.Machine1.System_Attributes[  2] = WORKED_Entity_Average_Staying_Time_in_DESObject
0:00:00:01.000
UM_Model_01.Machine1.System_Attributes[  3] = WORKED_Entity_Through_Output_Rate at Output_Channel[0]
0.9833333 [entity/seconds]
UM_Model_01.Machine1.System_Attributes[  4] = WORKED_Entity_Produce_Time at Output_Channel[0]
1.0169492 [seconds/entity]

UM_Model_01.Machine1.First_Calculation? =False

UM_Model_01.Machine1.InputChannel_Index_Selection_Strategy =TSelection_Random_Selected_Index
UM_Model_01.Machine1.InputChannel_Index =0

UM_Model_01.Machine1.Number_Of_InputChannels =6

```

```
UM_Model_01.Machine1.Input [ 0].Data =#Empty
UM_Model_01.Machine1.Input [ 0].Channel_Is_Enabled =True
UM_Model_01.Machine1.Input [ 0].Channel_Is_Connected =True    (#_of_Entities= 61)

UM_Model_01.Machine1.Input [ 1].Data =#Empty
UM_Model_01.Machine1.Input [ 1].Channel_Is_Enabled =True
UM_Model_01.Machine1.Input [ 1].Channel_Is_Connected =False    (#_of_Entities= 0)

UM_Model_01.Machine1.Input [ 2].Data =#Empty
UM_Model_01.Machine1.Input [ 2].Channel_Is_Enabled =True
UM_Model_01.Machine1.Input [ 2].Channel_Is_Connected =False    (#_of_Entities= 0)

UM_Model_01.Machine1.Input [ 3].Data =#Empty
UM_Model_01.Machine1.Input [ 3].Channel_Is_Enabled =True
UM_Model_01.Machine1.Input [ 3].Channel_Is_Connected =False    (#_of_Entities= 0)

UM_Model_01.Machine1.Input [ 4].Data =#Empty
UM_Model_01.Machine1.Input [ 4].Channel_Is_Enabled =True
UM_Model_01.Machine1.Input [ 4].Channel_Is_Connected =False    (#_of_Entities= 0)

UM_Model_01.Machine1.Input [ 5].Data =#Empty
UM_Model_01.Machine1.Input [ 5].Channel_Is_Enabled =True
UM_Model_01.Machine1.Input [ 5].Channel_Is_Connected =False    (#_of_Entities= 0)

UM_Model_01.Machine1.Capacity =1
UM_Model_01.Machine1.Number_Of_Content_Entities =1
UM_Model_01.Machine1.Content_Entities_Vector[ 0] =#83

UM_Model_01.Machine1.OutputChannel_Index_Selection_Strategy =TSelection_Random_Selected_Index
UM_Model_01.Machine1.OutputChannel_Index =0

UM_Model_01.Machine1.Number_Of_OutputChannels =6

UM_Model_01.Machine1.Output [ 0].Data =#Empty
UM_Model_01.Machine1.Output [ 0].Channel_Is_Enabled =True
UM_Model_01.Machine1.Output [ 0].Channel_Is_Connected =True    (#_of_Entities= 60)

UM_Model_01.Machine1.Output [ 1].Data =#Empty
```

```
UM_Model_01.Machine1.Output [ 1].Channel_Is_Enabled =True
UM_Model_01.Machine1.Output [ 1].Channel_Is_Connected =False    (#_of_Entities= 0)

UM_Model_01.Machine1.Output [ 2].Data =#Empty
UM_Model_01.Machine1.Output [ 2].Channel_Is_Enabled =True
UM_Model_01.Machine1.Output [ 2].Channel_Is_Connected =False    (#_of_Entities= 0)

UM_Model_01.Machine1.Output [ 3].Data =#Empty
UM_Model_01.Machine1.Output [ 3].Channel_Is_Enabled =True
UM_Model_01.Machine1.Output [ 3].Channel_Is_Connected =False    (#_of_Entities= 0)

UM_Model_01.Machine1.Output [ 4].Data =#Empty
UM_Model_01.Machine1.Output [ 4].Channel_Is_Enabled =True
UM_Model_01.Machine1.Output [ 4].Channel_Is_Connected =False    (#_of_Entities= 0)

UM_Model_01.Machine1.Output [ 5].Data =#Empty
UM_Model_01.Machine1.Output [ 5].Channel_Is_Enabled =True
UM_Model_01.Machine1.Output [ 5].Channel_Is_Connected =False    (#_of_Entities= 0)
```

```
*****
TMACHINE_end_TMACHINE_end_TMACHINE_end_TMACHINE_end_TMACHINE_end_TMACHINE_end_
-----
```

```
#####
#####
UM_Model_01.DESBranch_DESObjectList[    2]
```

```
*****
TSINK_start_TSINK_start_TSINK_start_TSINK_start_TSINK_start_TSINK_start_TSINK_
+++++
```

```
UM_Model_01.Sink1.SINK_Last_Content_Entity_ID_Number =#0
UM_Model_01.Sink1.SINK_NumberOfSinkedObjects =60
```

```
UM_Model_01.Sink1.SINK_Last_Calculation_Time = 0:00:01:00.000
.....
```

```

UM_Model_01.Sink1.DESObject_Owner_class =<TDES_BRANCH.TDES_BRANCH object at 0x000002149EC76EB0>      (UM_Model_01)

UM_Model_01.Sink1.DESObject_Name_str =Sink1
UM_Model_01.Sink1.DESObject_ID_Number =14
UM_Model_01.Sink1.DESObject_Type =TSINK

UM_Model_01.Sink1.DESObject_Priority_To_DESEntity_From_DESObject =0
UM_Model_01.Sink1.DESBranch_Name_str =UM_Model_01

UM_Model_01.Sink1.DESObject_Commanded_State_In_Previous_Step =TCommanded_Enabled_State
UM_Model_01.Sink1.DESObject_Commanded_State =TCommanded_Enabled_State

UM_Model_01.Sink1.DESObject_Work_State =TIdle
UM_Model_01.Sink1.DESObject_Work_State_In_Previous_Step =TIdle
UM_Model_01.Sink1.DESObject_Work_State_Before_Fail_Or_Pause =TIdle

UM_Model_01.Sink1.Time_Percent_In_Statuses[   TIdle] =100.000
UM_Model_01.Sink1.Time_Percent_In_Statuses[   TBusy] =  0.000
UM_Model_01.Sink1.Time_Percent_In_Statuses[TBlocked] =  0.000
UM_Model_01.Sink1.Time_Percent_In_Statuses[ TFailed] =  0.000
UM_Model_01.Sink1.Time_Percent_In_Statuses[ TPaused] =  0.000

UM_Model_01.Sink1.System_Attributes[   i] = Name                                     Value
UM_Model_01.Sink1.System_Attributes[   0] = WORKED_Entity_Sample_Number           60
UM_Model_01.Sink1.System_Attributes[   1] = WORKED_Entity_Sample_Summa           0.0
UM_Model_01.Sink1.System_Attributes[   2] = WORKED_Entity_Average_Staying_Time_in_DESObject
0:00:00:00.000

UM_Model_01.Sink1.First_Calculation? =False

UM_Model_01.Sink1.InputChannel_Index_Selection_Strategy = TSelection_Random_Selected_Index
UM_Model_01.Sink1.InputChannel_Index =0

UM_Model_01.Sink1.Number_Of_InputChannels =6

UM_Model_01.Sink1.Input [ 0].Data =#Empty

```

```
UM_Model_01.Sink1.Input [ 0].Channel_Is_Enabled =True
UM_Model_01.Sink1.Input [ 0].Channel_Is_Connected =True    (#_of_Entities= 60)

UM_Model_01.Sink1.Input [ 1].Data =#Empty
UM_Model_01.Sink1.Input [ 1].Channel_Is_Enabled =True
UM_Model_01.Sink1.Input [ 1].Channel_Is_Connected =False    (#_of_Entities= 0)

UM_Model_01.Sink1.Input [ 2].Data =#Empty
UM_Model_01.Sink1.Input [ 2].Channel_Is_Enabled =True
UM_Model_01.Sink1.Input [ 2].Channel_Is_Connected =False    (#_of_Entities= 0)

UM_Model_01.Sink1.Input [ 3].Data =#Empty
UM_Model_01.Sink1.Input [ 3].Channel_Is_Enabled =True
UM_Model_01.Sink1.Input [ 3].Channel_Is_Connected =False    (#_of_Entities= 0)

UM_Model_01.Sink1.Input [ 4].Data =#Empty
UM_Model_01.Sink1.Input [ 4].Channel_Is_Enabled =True
UM_Model_01.Sink1.Input [ 4].Channel_Is_Connected =False    (#_of_Entities= 0)

UM_Model_01.Sink1.Input [ 5].Data =#Empty
UM_Model_01.Sink1.Input [ 5].Channel_Is_Enabled =True
UM_Model_01.Sink1.Input [ 5].Channel_Is_Connected =False    (#_of_Entities= 0)

UM_Model_01.Sink1.Capacity =1
UM_Model_01.Sink1.Number_Of_Content_Entities =0
```

```
*****
TSINK_end_TSINK_end_TSINK_end_TSINK_end_TSINK_end_TSINK_end_TSINK_end_TSINK_end_
-----
```

```
#####
#####
UM_Model_01.DESBranch_DESObjectList[      3]
```

```
*****
TSOURCE_start_TSOURCE_start_TSOURCE_start_TSOURCE_start_TSOURCE_start_TSOURCE_
```

+++++

UM_Model_01.Source1.SOURCE_Created_Entity.Name_str =Created_Entity_Name

UM_Model_01.Source1.SOURCE_Time_Of_Next_Launching = 0:00:01:02.000

UM_Model_01.Source1.SOURCE_Time_Step = 0:00:00:01.000

UM_Model_01.Source1.SOURCE_Distribution =TDistribution_Constant_Value

UM_Model_01.Source1.SOURCE_Constant_Value_Of_Time = 0:00:00:01.000

UM_Model_01.Source1.SOURCE_Mean_Of_Time = 0:00:00:01.000

UM_Model_01.Source1.SOURCE_Deviation_Of_Time = 0:00:00:01.000

UM_Model_01.Source1.SOURCE_Maximum_Of_Time = 0:00:00:03.000

UM_Model_01.Source1.SOURCE_Usual_Of_Time = 0:00:00:02.000

UM_Model_01.Source1.SOURCE_Minimum_Of_Time = 0:00:00:01.000

UM_Model_01.Source1.SOURCE_Maximum_Batch_Size =2000000000

UM_Model_01.Source1.SOURCE_Number_Of_Created_Objects =61

UM_Model_01.Source1.SOURCE_Last_Calculation_Time = 0:00:01:01.000

.....

UM_Model_01.Source1.DESObject_Owner_class =<TDES_BRANCH.TDES_BRANCH object at 0x000002149EC76EB0> (UM_Model_01)

UM_Model_01.Source1.DESObject_Name_str =Source1

UM_Model_01.Source1.DESObject_ID_Number =15

UM_Model_01.Source1.DESObject_Type =TSOURCE

UM_Model_01.Source1.DESObject_Priority_To_DESEntity_From_DESObject =0

UM_Model_01.Source1.DESBranch_Name_str =UM_Model_01

UM_Model_01.Source1.DESObject_Commanded_State_In_Previous_Step =TCommanded_Enabled_State

UM_Model_01.Source1.DESObject_Commanded_State =TCommanded_Enabled_State

UM_Model_01.Source1.DESObject_Work_State =TIdle

UM_Model_01.Source1.DESObject_Work_State_In_Previous_Step =TIdle

UM_Model_01.Source1.DESObject_Work_State_Before_Fail_Or_Pause =TIdle


```

UM_Model_01.Source1.Time_Percent_In_Statues[  TIdle] =100.000
UM_Model_01.Source1.Time_Percent_In_Statues[  TBusy] =  0.000
UM_Model_01.Source1.Time_Percent_In_Statues[TBlocked] =  0.000
UM_Model_01.Source1.Time_Percent_In_Statues[ TFailed] =  0.000
UM_Model_01.Source1.Time_Percent_In_Statues[ TPaused] =  0.000

UM_Model_01.Source1.System_Attributes[  i] = Name
Value
UM_Model_01.Source1.System_Attributes[  0] = WORKED_Entity_Sample_Number           62
UM_Model_01.Source1.System_Attributes[  1] = WORKED_Entity_Sample_Summa           0.0
UM_Model_01.Source1.System_Attributes[  2] = WORKED_Entity_Average_Staying_Time_in_DESObject
0:00:00:00.000
UM_Model_01.Source1.System_Attributes[  3] = WORKED_Entity_Through_Output_Rate at Output_Channel[0]
1.0000000 [entity/seconds]
UM_Model_01.Source1.System_Attributes[  4] = WORKED_Entity_Produce_Time at Output_Channel[0]
1.0000000 [seconds/entity]

UM_Model_01.Source1.First_Calculation? =False

UM_Model_01.Source1.Capacity =1
UM_Model_01.Source1.Number_Of_Content_Entities =0

UM_Model_01.Source1.OutputChannel_Index_Selection_Strategy =TSelection_Random_Selected_Index
UM_Model_01.Source1.OutputChannel_Index =0

UM_Model_01.Source1.Number_Of_OutputChannels =6

UM_Model_01.Source1.Output [ 0].Data =#Created_Entity_Name_(#84)
UM_Model_01.Source1.Output [ 0].Channel_Is_Enabled =True
UM_Model_01.Source1.Output [ 0].Channel_Is_Connected =True    (#_of_Entities= 61)

UM_Model_01.Source1.Output [ 1].Data =#Empty
UM_Model_01.Source1.Output [ 1].Channel_Is_Enabled =True
UM_Model_01.Source1.Output [ 1].Channel_Is_Connected =False    (#_of_Entities= 0)

UM_Model_01.Source1.Output [ 2].Data =#Empty
UM_Model_01.Source1.Output [ 2].Channel_Is_Enabled =True
UM_Model_01.Source1.Output [ 2].Channel_Is_Connected =False    (#_of_Entities= 0)

```

```
UM_Model_01.Source1.Output [ 3].Data =#Empty
UM_Model_01.Source1.Output [ 3].Channel_Is_Enabled =True
UM_Model_01.Source1.Output [ 3].Channel_Is_Connected =False    (#_of_Entities= 0)

UM_Model_01.Source1.Output [ 4].Data =#Empty
UM_Model_01.Source1.Output [ 4].Channel_Is_Enabled =True
UM_Model_01.Source1.Output [ 4].Channel_Is_Connected =False    (#_of_Entities= 0)

UM_Model_01.Source1.Output [ 5].Data =#Empty
UM_Model_01.Source1.Output [ 5].Channel_Is_Enabled =True
UM_Model_01.Source1.Output [ 5].Channel_Is_Connected =False    (#_of_Entities= 0)

*****
TSOURCE_end_TSOURCE_end_TSOURCE_end_TSOURCE_end_TSOURCE_end_TSOURCE_end_TSOURCE_
-----

End of "UM_Model_01.Print_DESObjectList"
```

5.1.3 DES_Modell_01 TDES_ENTITY list

```
Model_201.Print_DESEntityList_Short: (ENTITYLIST Result)
Local time :Fri Oct 23 08:23:06 2020
Model_Name : UM_Model_01
```

```
UM_Model_01.Print_DESEntityList_Short: (ENTITYLIST Result)
```

```
=====
```

```
Number of Entities = 2
```

```
GTime_Now [DDD:HH:MM:SS.XXX] = 0:00:01:01.000
```

```
=====
```

```
=====
```

```
=====
```

```
UM_Model_01.ENTITYLIST[      i] =                Entity_Name  Entity_Position
```

```
Entity_Content
```

```
=====
```

```
=====
```

```
=====
```

```
UM_Model_01.ENTITYLIST[      0] = Created_Entity_Name_(#83)  (Machine1__{TIn_Object})
```

```
UM_Model_01.ENTITYLIST[      1] = Created_Entity_Name_(#84)  (Source1__{TAt_Output_Channel[0]})
```

```
UM_Model_01.Print_ENTITYLIST: (ENTITYLIST Result)
```

```
=====
```

```
Number of Entities = 2
```

```
GTime_Now [DDD:HH:MM:SS.XXX] = 0:00:01:01.000
```

```
#####
```

```
#####
```

```
ENTITYLIST[      0]
```

```
ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_
```

```
+++++
```

```
UM_Model_01.Created_Entity_Name_(#83).DESEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at
0x00000214A0BE5F40>      (ENTITYLIST)
```

```
UM_Model_01.Created_Entity_Name_(#83).Name_Of_Entity_str =Created_Entity_Name_(#83)
UM_Model_01.Created_Entity_Name_(#83).Borning_Time      = 0:00:01:00.000
UM_Model_01.Created_Entity_Name_(#83).Terminate_Time = Entity is staying in "Machine1__{TIn_Object}"
```

```
UM_Model_01.Created_Entity_Name_(#83).InputChannel_Index_Of_Arrive =0
UM_Model_01.Created_Entity_Name_(#83).OutputChannel_Index_Of_Leave =0
```

```
UM_Model_01.Created_Entity_Name_(#83).System_Attribute[ 0] =
WORKED_Entity_Arrive_Time      60.000      60.000
UM_Model_01.Created_Entity_Name_(#83).System_Attribute[ 1] =
WORKED_Entity_Terminate_Time   -1      Entity is staying in "__{TIn_Object}"
UM_Model_01.Created_Entity_Name_(#83).System_Attribute[ 2] =
DESEntity_Time_Of_Next_Launching      61.0   in "Machine1"
```

```
UM_Model_01.Created_Entity_Name_(#83).Number_Of_Content_Entities =0
```

```
-----
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_
```

```
#####
#####
ENTITYLIST[      1]
```

```
ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_
+++++++
UM_Model_01.Created_Entity_Name_(#84).DESEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at
0x00000214A0BE5F40>      (ENTITYLIST)
```

```
UM_Model_01.Created_Entity_Name_(#84).Name_Of_Entity_str =Created_Entity_Name_(#84)
UM_Model_01.Created_Entity_Name_(#84).Borning_Time      = 0:00:01:01.000
UM_Model_01.Created_Entity_Name_(#84).Terminate_Time = Entity is staying in "Source1__{TAt_Output_Channel[0]}"
```

```
UM_Model_01.Created_Entity_Name_(#84).InputChannel_Index_Of_Arrive =0
UM_Model_01.Created_Entity_Name_(#84).OutputChannel_Index_Of_Leave =0
```

```
UM_Model_01.Created_Entity_Name_(#84).System_Attribute[ 0] =  
WORKED_Entity_Arrive_Time      61.000      61.000  
UM_Model_01.Created_Entity_Name_(#84).System_Attribute[ 1] =  
WORKED_Entity_Terminate_Time      61.000  
  
UM_Model_01.Created_Entity_Name_(#84).Number_Of_Content_Entities =0  
-----  
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_
```

5.1.4 DES_Modell_01 TDES_SINKED_ENTITY list

Local time :Fri Oct 23 08:23:06 2020

Model_Name : UM_Model_01

UM_Model_01.Print_DESEntityList_Short: (SINKED ENTITYLIST Result)

=====

Number of Entities = 60

GTime_Now [DDD:HH:MM:SS.XXX] = 0:00:01:01.000

=====

=====

=====

UM_Model_01.SINKED_ENTITYLIST[i]	Entity_Name	Entity_Position
Borning_Time	Terminate_Time	Entity_Age

=====

=====

=====

UM_Model_01.SINKED_ENTITYLIST[0]	= Created_Entity_Name_(#23)	(Sink1__ {TIn_Object})
0:00:00:00.000	0:00:00:01.000	0:00:00:01.000
UM_Model_01.SINKED_ENTITYLIST[1]	= Created_Entity_Name_(#24)	(Sink1__ {TIn_Object})
0:00:00:01.000	0:00:00:02.000	0:00:00:01.000
UM_Model_01.SINKED_ENTITYLIST[2]	= Created_Entity_Name_(#25)	(Sink1__ {TIn_Object})
0:00:00:02.000	0:00:00:03.000	0:00:00:01.000
UM_Model_01.SINKED_ENTITYLIST[3]	= Created_Entity_Name_(#26)	(Sink1__ {TIn_Object})
0:00:00:03.000	0:00:00:04.000	0:00:00:01.000
UM_Model_01.SINKED_ENTITYLIST[4]	= Created_Entity_Name_(#27)	(Sink1__ {TIn_Object})
0:00:00:04.000	0:00:00:05.000	0:00:00:01.000
UM_Model_01.SINKED_ENTITYLIST[5]	= Created_Entity_Name_(#28)	(Sink1__ {TIn_Object})
0:00:00:05.000	0:00:00:06.000	0:00:00:01.000
UM_Model_01.SINKED_ENTITYLIST[6]	= Created_Entity_Name_(#29)	(Sink1__ {TIn_Object})
0:00:00:06.000	0:00:00:07.000	0:00:00:01.000
UM_Model_01.SINKED_ENTITYLIST[7]	= Created_Entity_Name_(#30)	(Sink1__ {TIn_Object})
0:00:00:07.000	0:00:00:08.000	0:00:00:01.000

UM_Model_01.SINKED_ENTITYLIST[	8]	=	Created_Entity_Name_(#31)	(Sink1__TIn_Object))
0:00:00:08.000	0:00:00:09.000		0:00:00:01.000	
UM_Model_01.SINKED_ENTITYLIST[	9]	=	Created_Entity_Name_(#32)	(Sink1__TIn_Object))
0:00:00:09.000	0:00:00:00.000		0:00:00:01.000	
UM_Model_01.SINKED_ENTITYLIST[	10]	=	Created_Entity_Name_(#33)	(Sink1__TIn_Object))
0:00:00:00.000	0:00:00:11.000		0:00:00:01.000	
UM_Model_01.SINKED_ENTITYLIST[	11]	=	Created_Entity_Name_(#34)	(Sink1__TIn_Object))
0:00:00:11.000	0:00:00:12.000		0:00:00:01.000	
UM_Model_01.SINKED_ENTITYLIST[	12]	=	Created_Entity_Name_(#35)	(Sink1__TIn_Object))
0:00:00:12.000	0:00:00:13.000		0:00:00:01.000	
UM_Model_01.SINKED_ENTITYLIST[	13]	=	Created_Entity_Name_(#36)	(Sink1__TIn_Object))
0:00:00:13.000	0:00:00:14.000		0:00:00:01.000	
UM_Model_01.SINKED_ENTITYLIST[	14]	=	Created_Entity_Name_(#37)	(Sink1__TIn_Object))
0:00:00:14.000	0:00:00:15.000		0:00:00:01.000	
UM_Model_01.SINKED_ENTITYLIST[	15]	=	Created_Entity_Name_(#38)	(Sink1__TIn_Object))
0:00:00:15.000	0:00:00:16.000		0:00:00:01.000	
UM_Model_01.SINKED_ENTITYLIST[	16]	=	Created_Entity_Name_(#39)	(Sink1__TIn_Object))
0:00:00:16.000	0:00:00:17.000		0:00:00:01.000	
UM_Model_01.SINKED_ENTITYLIST[	17]	=	Created_Entity_Name_(#40)	(Sink1__TIn_Object))
0:00:00:17.000	0:00:00:18.000		0:00:00:01.000	
UM_Model_01.SINKED_ENTITYLIST[	18]	=	Created_Entity_Name_(#41)	(Sink1__TIn_Object))
0:00:00:18.000	0:00:00:19.000		0:00:00:01.000	
UM_Model_01.SINKED_ENTITYLIST[	19]	=	Created_Entity_Name_(#42)	(Sink1__TIn_Object))
0:00:00:19.000	0:00:00:20.000		0:00:00:01.000	
UM_Model_01.SINKED_ENTITYLIST[	20]	=	Created_Entity_Name_(#43)	(Sink1__TIn_Object))
0:00:00:20.000	0:00:00:21.000		0:00:00:01.000	
UM_Model_01.SINKED_ENTITYLIST[	21]	=	Created_Entity_Name_(#44)	(Sink1__TIn_Object))
0:00:00:21.000	0:00:00:22.000		0:00:00:01.000	
UM_Model_01.SINKED_ENTITYLIST[	22]	=	Created_Entity_Name_(#45)	(Sink1__TIn_Object))
0:00:00:22.000	0:00:00:23.000		0:00:00:01.000	
UM_Model_01.SINKED_ENTITYLIST[	23]	=	Created_Entity_Name_(#46)	(Sink1__TIn_Object))
0:00:00:23.000	0:00:00:24.000		0:00:00:01.000	
UM_Model_01.SINKED_ENTITYLIST[	24]	=	Created_Entity_Name_(#47)	(Sink1__TIn_Object))
0:00:00:24.000	0:00:00:25.000		0:00:00:01.000	
UM_Model_01.SINKED_ENTITYLIST[	25]	=	Created_Entity_Name_(#48)	(Sink1__TIn_Object))
0:00:00:25.000	0:00:00:26.000		0:00:00:01.000	
UM_Model_01.SINKED_ENTITYLIST[	26]	=	Created_Entity_Name_(#49)	(Sink1__TIn_Object))
0:00:00:26.000	0:00:00:27.000		0:00:00:01.000	

UM_Model_01.SINKED_ENTITYLIST[27]	=	Created_Entity_Name_(#50)	(Sink1__ {TIn_Object})
0:00:00:27.000 0:00:00:28.000		0:00:00:01.000	
UM_Model_01.SINKED_ENTITYLIST[28]	=	Created_Entity_Name_(#51)	(Sink1__ {TIn_Object})
0:00:00:28.000 0:00:00:29.000		0:00:00:01.000	
UM_Model_01.SINKED_ENTITYLIST[29]	=	Created_Entity_Name_(#52)	(Sink1__ {TIn_Object})
0:00:00:29.000 0:00:00:30.000		0:00:00:01.000	
UM_Model_01.SINKED_ENTITYLIST[30]	=	Created_Entity_Name_(#53)	(Sink1__ {TIn_Object})
0:00:00:30.000 0:00:00:31.000		0:00:00:01.000	
UM_Model_01.SINKED_ENTITYLIST[31]	=	Created_Entity_Name_(#54)	(Sink1__ {TIn_Object})
0:00:00:31.000 0:00:00:32.000		0:00:00:01.000	
UM_Model_01.SINKED_ENTITYLIST[32]	=	Created_Entity_Name_(#55)	(Sink1__ {TIn_Object})
0:00:00:32.000 0:00:00:33.000		0:00:00:01.000	
UM_Model_01.SINKED_ENTITYLIST[33]	=	Created_Entity_Name_(#56)	(Sink1__ {TIn_Object})
0:00:00:33.000 0:00:00:34.000		0:00:00:01.000	
UM_Model_01.SINKED_ENTITYLIST[34]	=	Created_Entity_Name_(#57)	(Sink1__ {TIn_Object})
0:00:00:34.000 0:00:00:35.000		0:00:00:01.000	
UM_Model_01.SINKED_ENTITYLIST[35]	=	Created_Entity_Name_(#58)	(Sink1__ {TIn_Object})
0:00:00:35.000 0:00:00:36.000		0:00:00:01.000	
UM_Model_01.SINKED_ENTITYLIST[36]	=	Created_Entity_Name_(#59)	(Sink1__ {TIn_Object})
0:00:00:36.000 0:00:00:37.000		0:00:00:01.000	
UM_Model_01.SINKED_ENTITYLIST[37]	=	Created_Entity_Name_(#60)	(Sink1__ {TIn_Object})
0:00:00:37.000 0:00:00:38.000		0:00:00:01.000	
UM_Model_01.SINKED_ENTITYLIST[38]	=	Created_Entity_Name_(#61)	(Sink1__ {TIn_Object})
0:00:00:38.000 0:00:00:39.000		0:00:00:01.000	
UM_Model_01.SINKED_ENTITYLIST[39]	=	Created_Entity_Name_(#62)	(Sink1__ {TIn_Object})
0:00:00:39.000 0:00:00:40.000		0:00:00:01.000	
UM_Model_01.SINKED_ENTITYLIST[40]	=	Created_Entity_Name_(#63)	(Sink1__ {TIn_Object})
0:00:00:40.000 0:00:00:41.000		0:00:00:01.000	
UM_Model_01.SINKED_ENTITYLIST[41]	=	Created_Entity_Name_(#64)	(Sink1__ {TIn_Object})
0:00:00:41.000 0:00:00:42.000		0:00:00:01.000	
UM_Model_01.SINKED_ENTITYLIST[42]	=	Created_Entity_Name_(#65)	(Sink1__ {TIn_Object})
0:00:00:42.000 0:00:00:43.000		0:00:00:01.000	
UM_Model_01.SINKED_ENTITYLIST[43]	=	Created_Entity_Name_(#66)	(Sink1__ {TIn_Object})
0:00:00:43.000 0:00:00:44.000		0:00:00:01.000	
UM_Model_01.SINKED_ENTITYLIST[44]	=	Created_Entity_Name_(#67)	(Sink1__ {TIn_Object})
0:00:00:44.000 0:00:00:45.000		0:00:00:01.000	
UM_Model_01.SINKED_ENTITYLIST[45]	=	Created_Entity_Name_(#68)	(Sink1__ {TIn_Object})
0:00:00:45.000 0:00:00:46.000		0:00:00:01.000	


```

UM_Model_01.SINKED_ENTITYLIST[ 46] = Created_Entity_Name_(#69) (Sink1__ {TIn_Object})
0:00:00:46.000      0:00:00:47.000      0:00:00:01.000
UM_Model_01.SINKED_ENTITYLIST[ 47] = Created_Entity_Name_(#70) (Sink1__ {TIn_Object})
0:00:00:47.000      0:00:00:48.000      0:00:00:01.000
UM_Model_01.SINKED_ENTITYLIST[ 48] = Created_Entity_Name_(#71) (Sink1__ {TIn_Object})
0:00:00:48.000      0:00:00:49.000      0:00:00:01.000
UM_Model_01.SINKED_ENTITYLIST[ 49] = Created_Entity_Name_(#72) (Sink1__ {TIn_Object})
0:00:00:49.000      0:00:00:50.000      0:00:00:01.000
UM_Model_01.SINKED_ENTITYLIST[ 50] = Created_Entity_Name_(#73) (Sink1__ {TIn_Object})
0:00:00:50.000      0:00:00:51.000      0:00:00:01.000
UM_Model_01.SINKED_ENTITYLIST[ 51] = Created_Entity_Name_(#74) (Sink1__ {TIn_Object})
0:00:00:51.000      0:00:00:52.000      0:00:00:01.000
UM_Model_01.SINKED_ENTITYLIST[ 52] = Created_Entity_Name_(#75) (Sink1__ {TIn_Object})
0:00:00:52.000      0:00:00:53.000      0:00:00:01.000
UM_Model_01.SINKED_ENTITYLIST[ 53] = Created_Entity_Name_(#76) (Sink1__ {TIn_Object})
0:00:00:53.000      0:00:00:54.000      0:00:00:01.000
UM_Model_01.SINKED_ENTITYLIST[ 54] = Created_Entity_Name_(#77) (Sink1__ {TIn_Object})
0:00:00:54.000      0:00:00:55.000      0:00:00:01.000
UM_Model_01.SINKED_ENTITYLIST[ 55] = Created_Entity_Name_(#78) (Sink1__ {TIn_Object})
0:00:00:55.000      0:00:00:56.000      0:00:00:01.000
UM_Model_01.SINKED_ENTITYLIST[ 56] = Created_Entity_Name_(#79) (Sink1__ {TIn_Object})
0:00:00:56.000      0:00:00:57.000      0:00:00:01.000
UM_Model_01.SINKED_ENTITYLIST[ 57] = Created_Entity_Name_(#80) (Sink1__ {TIn_Object})
0:00:00:57.000      0:00:00:58.000      0:00:00:01.000
UM_Model_01.SINKED_ENTITYLIST[ 58] = Created_Entity_Name_(#81) (Sink1__ {TIn_Object})
0:00:00:58.000      0:00:00:59.000      0:00:00:01.000
UM_Model_01.SINKED_ENTITYLIST[ 59] = Created_Entity_Name_(#82) (Sink1__ {TIn_Object})
0:00:00:59.000      0:00:01:00.000      0:00:00:01.000

```

5.1.5 DES_Modell_01 TDES_TASK list

Local time :Fri Oct 23 08:23:06 2020
 Model_Name : UM_Model_01

UM_Model_01.Print_DESBranch_TaskList:

=====

Number of DES_Tasks = 5

GTime_Now [DDD:HH:MM:SS.XXX] = 0:00:01:01.000

=====

=====

=====

UM_Model_01.DESTaskList [i] =	TaskTime	Sender_Name	DESOBJECT_Type	Command	Process#
State Content					

=====

=====

=====

UM_Model_01.DESTaskList [0] =	0:00:01:01.000	Source1	TSOURCE	TDESOBJECT_Next_State	0
TIIdle >nil>-[x]->#84,x,x,x,x,x>					
UM_Model_01.DESTaskList [1] =	0:00:01:01.000	Machine1	TMACHINE	TDESOBJECT_Next_State	0
TBusy >x,x,x,x,x,x>-[#83]->x,x,x,x,x,x>					
UM_Model_01.DESTaskList [2] =	0:00:01:01.000	Source1	TSOURCE	TENTITY_Move_Request	0
TIIdle >nil>-[x]->#84,x,x,x,x,x>					
UM_Model_01.DESTaskList [3] =	0:00:01:01.000	Source1	TSOURCE	TENTITY_Move_Request	0
TIIdle >nil>-[x]->#84,x,x,x,x,x>					
UM_Model_01.DESTaskList [4] =	0:00:01:02.000	Source1	TSOURCE	TDESOBJECT_Next_State	0
TIIdle >nil>-[x]->#84,x,x,x,x,x>					

5.1.6 DES_Modell_01 TBUFFER occupancy list

```
Local time :Fri Oct 23 08:23:06 2020
Model_Name : UM_Model_01
```

```
UM_Model_01.Print_Content_Entities_Vector_Occupancy:
```

```
=====
```

```
Number of DESObjects = 1
```

```
GTime_Now [DDD:HH:MM:SS.XXX] = 0:00:01:01.000
```

```
UM_Model_01.DESBranch_DESObjectList[ 0].DESObject_Name_str = Buffer1 (Type = TBUFFER)
```

```
(Content) Percent%
```

```
( 0) 100.00%
```

```
| *****
```

```
( 1) 0.00% |
```

```
( 2) 0.00% |
```

```
( 3) 0.00% |
```

```
( 4) 0.00% |
```

```
( 5) 0.00% |
```

```
( 6) 0.00% |
```

```
( 7) 0.00% |
```

```
( 8) 0.00% |
```

```
( 9) 0.00% |
```

```
End of "UM_Model_01.Print_TBUFFEs_Occupancy"
```

5.1.7 DES_Model_01 Program results

Run of "DES_Single_DESBranch.py" has started!

Local time :Fri Oct 23 08:23:06 2020

Model_Name : UM_Model_01

UM_Model_01.Print ObjectList Short:

=====

Number of DESObjects = 4

GTime_Now [DDD:HH:MM:SS.XXX] = 0:00:00:00.000

=====

=====

UM_Model_01.DESObjectList[i]	DESObject_Name	DESObject_Type	State	Last_Calculation_Time
DESObject_Content				

=====

=====

UM_Model_01.DESObjectList[0]	Buffer1	TBUFFER	TIdle	0:00:00:00.000
>x,x,x,x,x,x>-[x]->x,x,x,x,x,x> (Buffer is EMPTY Capacity = 10)				
UM_Model_01.DESObjectList[1]	Machinel	TMACHINE	TIdle	0:00:00:00.000
>x,x,x,x,x,x>-[x]->x,x,x,x,x,x> (Capacity = 1)				
UM_Model_01.DESObjectList[2]	Sink1	TSINK	TIdle	0:00:00:00.000
>x,x,x,x,x,x>-[x]->nil>				
UM_Model_01.DESObjectList[3]	Source1	TSOURCE	TIdle	0:00:00:00.000
>nil>-[x]->x,x,x,x,x,x> (Capacity = 1)				

UM_Model_01.DESBranch_Insert_First_DESTask_Of_SOURCES_Into_DESTaskList

=====

UM_Model_01.Print_DESBranch_TaskList:

```

=====
Number of DES_Tasks = 1
GTime_Now [DDD:HH:MM:SS.XXX] = 0:00:00:00.000
=====
=====
=====
UM_Model_01.DESTaskList [ i] = TaskTimeSender_Name DESObject_Type Command Process#
State Content
=====
=====
=====
UM_Model_01.DESTaskList [ 0] = 0:00:00:00.000 Source1 TSOURCE TDESOBJECT_Next_State 0
TIdle >nil>-[x]->x,x,x,x,x,x,x>

UM_Model_01.DESBranch_Calculate_Next_DESTask:
=====

UM_Model_01.Print_DESEntityList_Short: (ENTITYLIST Result)
=====
Number of Entities = 2
GTime_Now [DDD:HH:MM:SS.XXX] = 0:00:01:01.000
=====
=====
=====
UM_Model_01.ENTITYLIST[ i] = Entity_Name Entity_Position
Entity_Content
=====
=====
=====
UM_Model_01.ENTITYLIST[ 0] = Created_Entity_Name_(#83) (Machine1__{TIn_Object})
UM_Model_01.ENTITYLIST[ 1] = Created_Entity_Name_(#84) (Source1__{TAt_Output_Channel[0]})

```

UM_Model_01.Print ObjectList Short:

=====

Number of DESObjects = 4

GTime_Now [DDD:HH:MM:SS.XXX] = 0:00:01:01.000

=====

UM_Model_01.DESObjectList[i]	DESObject_Name	DESObject_Type	State	Last_Calculation_Time
DESObject_Content				

=====

UM_Model_01.DESObjectList[0]	Buffer1	TBUFFER	TIdle	0:00:01:00.000

>x,x,x,x,x,x>-[x]->x,x,x,x,x,x> (Buffer is EMPTY Capacity = 10)

UM_Model_01.DESObjectList[1]	Machin1	TMACHINE	TBusy	0:00:01:00.000

>x,x,x,x,x,x>-[#83]->x,x,x,x,x,x> (Capacity = 1)

UM_Model_01.DESObjectList[2]	Sink1	TSINK	TIdle	0:00:01:00.000

>x,x,x,x,x,x>-[x]->nil>

UM_Model_01.DESObjectList[3]	Source1	TSOURCE	TIdle	0:00:01:01.000

>nil>-[x]->#84,x,x,x,x,x> (Capacity = 1)

UM_Model_01.Print_DESObjectList_Summary_Report (page 1 of 3):

=====

Number of DESObjects = 4

GTime_Now [DDD:HH:MM:SS.XXX] = 0:00:01:01.000

=====

UM_Model_01.DESObjectList[i]	DESObject_Name	DESObject_Type	Current_Content	Average_Content
Input_Entities#	Output_Entities#	Average_Staying_Time		

=====

```

UM_Model_01.DESObjectList[ 0] =      Buffer1      TBUFFER      0 [entities]      0.000 [entities]
61      61      0:00:00:00.000
UM_Model_01.DESObjectList[ 1] =      Machine1      TMACHINE      1 [entities]
61      60      0:00:00:01.000
UM_Model_01.DESObjectList[ 2] =      Sink1      TSINK      0 [entities]
60      0      0:00:00:00.000
UM_Model_01.DESObjectList[ 3] =      Source1      TSOURCE      0 [entities]
0      61      0:00:00:00.000

```

UM_Model_01.Print_DESObjectList_Summary_Report (page 2 of 3):

=====

Number of DESObjects = 4

GTime_Now [DDD:HH:MM:SS.XXX] = 0:00:01:01.000

=====

=====

=====

```

UM_Model_01.DESObjectList[ i] = DESObject_Name  DESObject_Type      in TIdle state [%]      in TBusy state [%]  in
TBlocked state[%]  in TFailed state [%]  in TPaused state [%]
=====
=====

```

=====

=====

```

UM_Model_01.DESObjectList[ 0] =      Buffer1      TBUFFER      100.00      0.00
0.00      0.00      0.00
UM_Model_01.DESObjectList[ 1] =      Machine1      TMACHINE      0.00      100.00
0.00      0.00      0.00
UM_Model_01.DESObjectList[ 2] =      Sink1      TSINK      100.00      0.00
0.00      0.00      0.00
UM_Model_01.DESObjectList[ 3] =      Source1      TSOURCE      100.00      0.00
0.00      0.00      0.00

```

UM_Model_01.Print_DESObjectList_Summary_Report (page 3 of 3):

=====

Number of DESObjects = 1

GTime_Now [DDD:HH:MM:SS.XXX] = 0:00:01:01.000

Occupancy of Content_Entities_Vector

```
=====
=====
=====
UM_Model_01.DESObjectList[    i] = DESObject_Name      Oppupancy[%] of Content_Entities_Vector elements
=====
=====
=====
UM_Model_01.DESObjectList[    0] =   Buffer1 = [ 100.00%,    0.00%,    0.00%,    0.00%,    0.00%,    0.00%,    0.00%,
0.00%,    0.00%,    0.00%,
]
```

Number_Of_Succesful_Entity_Move_Requests = 182

```
Number_Of_Source_Call =      122  ( 20.13 %)
Number_Of_Buffer_Call =      183  ( 30.20 %)
Number_Of_Machine_Call =     241  ( 39.77 %)
Number_Of_Sink_Call =       60  ( 9.90 %)
Number_Of_Wrapper_Call =       0  ( 0.00 %)
Number_Of_UnWrapper_Call =       0  ( 0.00 %)
Number_Of_Path_Call =        0  ( 0.00 %)
Number_Of_Lock_Call =        0  ( 0.00 %)
Number_Of_UnLock_Call =       0  ( 0.00 %)
=====
Summa_DESObject_Call =      606  (100.00 %)
```

```
Number_Of_All_Objects_Call      =      606
Number_Of_All_Entity_Move_Requests =      545
Number_Of_Process_Calculation_Cycles =      0
=====
Number_Of_All_Calculation_Cycles =     1151
```


Size of SINKED_ENTITYLIST = 60

Last Simulated Calculation Time [DAY:HH:MM:SS.XXX] = 0:00:01:01.000

DESBranch_Simulationtime_End ...[DAY:HH:MM:SS.XXX] = 0:00:01:00.000

Total Real Calculation Time [DAY:HH:MM:SS.XXX] = 0:00:00:00.076

Total Real Program Running Time [DAY:HH:MM:SS.XXX] = 0:00:00:00.097

Run of "DES_Single_DESBranch.py" has finished!

5.2 DES model 02

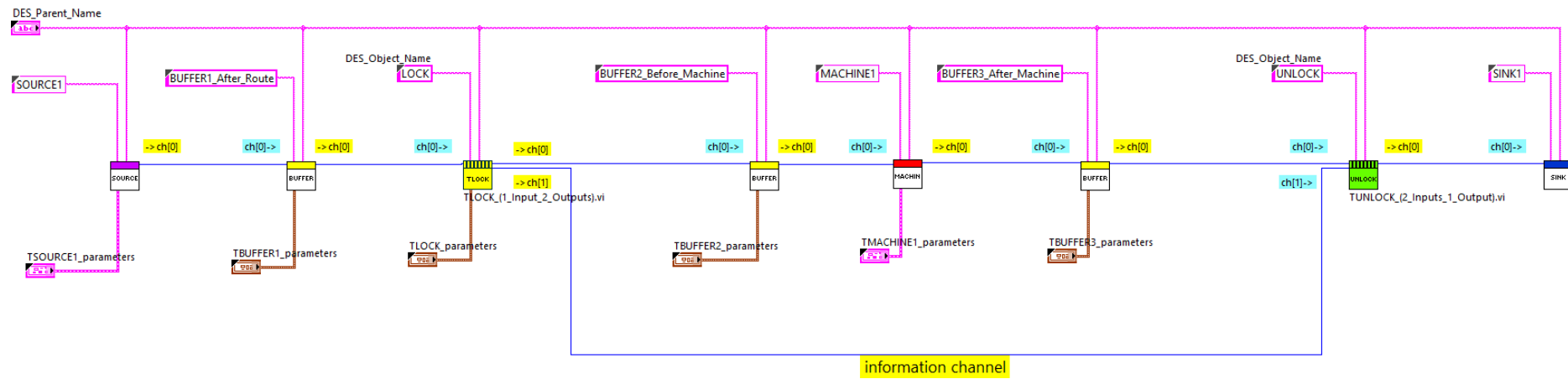


Figure 5.2.92 MODEL_02 block diagram LabVIEW graphical editor program

MODEL 02 (.mp4 film)

The meaning of the icons in the figure is:



is the icon for the Source (**TSOURCE**) DES object.



icon of the Buffer (**TBUFFER**) DES object.



a Machine (**TMACHINE**) des objects of any.



is the icon of the Sink (**TSINK**) DES object.



icon of the Entity Locking Lock (**TLOCK**) DES object.



is the icon of the Entity Enabler Open (**TUNLOCK**) DES object.

ch[0]->

is the output of the DES object through its output channel 0.

-> ch[0]

is the input to the DES object through its input channel 0.

The simulation model shows how to limit the number of Entities entering a model part.

The **TLOCK** DES object counts the number of Entities entering up to a preset value. Once the configured value is reached, no more Entities are allowed to pass on the **TLOCK** object.

An Entity that enters the **TUNLOCK** object reduces the count of Entities in the model part by one through the information channel linked to the **TLOCK** object. This allows another Entity to enter the Entity restricted model part.

TSOURCE1_parameters

SOURCE_Name_Of_Produced_Entity_str Alma	SOURCE_Distribution TDistribution_Constant_Value		SOURCE_Maximum_Of_Time 0:00:00:03.000
SOURCE_First_Time_of_Entity_Creation 0:00:00:00.000 hour:minute:second.xxx	SOURCE_Constant_Value_Of_Time 0:00:00:08.000 hour:minute:second.xxx	SOURCE_Mean_Of_Time 0:00:00:08.000	SOURCE_Usual_Of_Time 0:00:00:02.000
SOURCE_Maximum_Batch_Size 2000000000		SOURCE_Deviation_Of_Time 0:00:00:01.000 hour:minute:second.xxx	SOURCE_Minimum_Of_Time 0:00:00:01.000 hour:minute:second.xxx
Capacity 1	OutputChannel_Index_Selection_Strategy TSelection_Random_Selected_Index		
	OutputChannel_Index 0		

Figure 5.2.93 MODEL_03/TSOURCE1 parameters

TBUFFER1_parameters

BUFFER_Type_Of_Queue	InputChannel_Index	InputChannel_Index_Selection_Strategy
TQueue_First_In_First_Out	0	TSelection_Random_Selected_Index
Capacity	OutputChannel_Index	OutputChannel_Index_Selection_Strategy
20	0	TSelection_Random_Selected_Index

Figure 5.2.94 MODEL_03/TBUFFER1 parameters

TLOCK_parameters

LOCK_Entity_Number_Limit_in_Segment	(Mennyi lehet a szegmensben tartózkodó Entitások maximális darabszáma.)
26	
LOCK_Maximum_Number_of_Entities_in_Segment	(Mennyi volt az eddigi maximális Entitás darabszám.)
0	
LOCK_Actual_Number_of_Entities_in_Segment	(Mennyi a szegmensben tartózkodó Entitások aktuális darabszáma.)
0	

Figure 5.2.95 MODEL_03/TLOCK parameters

TBUFFER2_parameters

BUFFER_Type_Of_Queue	InputChannel_Index	InputChannel_Index_Selection_Strategy
TQueue_First_In_First_Out	0	TSelection_Cyclical_Selected_Index
Capacity	OutputChannel_Index	OutputChannel_Index_Selection_Strategy
20	0	TSelection_Random_Selected_Index

Figure 5.2.96 MODEL_03/TBUFFER2 parameters

TMACHINE1_parameters

MACHINE_Distribution TDistribution_Constant_Value	MACHINE_ConstantValue_Of_Time 0:00:00:10.000	MACHINE_Maximum_Of_Time 0:00:00:03.000
Capacity 1	MACHINE_Mean_Of_Time 0:00:00:10.000	MACHINE_Usual_Of_Time 0:00:00:02.000
InputChannel_Index_Selection_Strategy TSelection_Random_Selected_Index	MACHINE_Deviation_Of_Time 0:00:00:01.000 hour:minute:second.xxx	MACHINE_Minimum_Of_Time 0:00:00:01.000 hour:minute:second.xxx
InputChannel_Index 0	OutputChannel_Index_Selection_Strategy TSelection_Random_Selected_Index	
	OutputChannel_Index 0	

Figure 5.2.97 MODEL_03/TMACHINE1 parameters

TBUFFER3_parameters

BUFFER_Type_Of_Queue TQueue_First_In_First_Out	InputChannel_Index 0	InputChannel_Index_Selection_Strategy TSelection_Random_Selected_Index
Capacity 20	OutputChannel_Index 0	OutputChannel_Index_Selection_Strategy TSelection_Random_Selected_Index

Figure 5.2.98 MODEL_03/TBUFFER3 parameters

5.2.1 DES_Modell_02 Python program list

```
#####
#####
import sys
import time
from TDES_TYPES import *
from TDES_CHANNEL import *
from TDES_CONNECTION import *
from TDES_TASK import *
from TDES_ENTITY import *
from TDES_ENTITYLIST import *
from TDES_OBJECT import *
from TDES_BRANCH import *

#####
#####
#####
#####

class TUM_Model_02:

    #&&&&
    # 2020. 10. 22. 17:39:42

    def __init__(
        self,
        Model_Name_str,
    ):

        Branch =TDES_BRANCH(Model_Name_str)
        self.Branch = Branch
        self.Memo_str = ''
```



```

#####
#START OF TYPE DECLARATION
#Discrete Event Simulator

#####
#Initiate Branches
    Memol_str = ''
    Title_str = 'Initiate_DES_Branch:'
    Text_str = DES_Create_Text_Chain_str(
        len(Title_str),
        '='
    )
    Memol_str = Memol_str + Title_str + CRLF
    Memol_str = Memol_str + Text_str + CRLF

    #Branch = TDES_BRANCH(Branch_Name_str)
    Memol_str = Memol_str + 'Name_Of_Branch = ' + Branch.DESBranch_Name_str + CRLF

    Branch.DESBranch_Model_Name_str = 'DES_LabVIEW_Created_Model.py'
    Memol_str = Memol_str + 'Name_Of_Model = ' + Branch.DESBranch_Model_Name_str + CRLF

# ++++++
# Name of DES_OBJECT_2 = 'BUFFER1_After_Route'
# ++++++
    DES_OBJECT_2 = TDES_OBJECT(
        TBUFFER,          #Object_Type
        'BUFFER1_After_Route', #Object_Name_str
        6,                #Inputs
        6,                #Outputs
    )

```

```

DES_OBJECT_2.DESObject_InputChannel_Index_Selection_Strategy.Set_Item_str_to('TSelection_Random_Selected_Index')
    DES_OBJECT_2.DESObject_InputChannel_Index = 0

DES_OBJECT_2.DESObject_OutputChannel_Index_Selection_Strategy.Set_Item_str_to('TSelection_Random_Selected_Index')
    DES_OBJECT_2.DESObject_OutputChannel_Index = 0

    DES_OBJECT_2.BUFFER_Type_Of_Queue.Set_Item_str_to('TQueue_First_In_First_Out')

    DES_OBJECT_2.DESObject_Capacity = 20

# ++++++
# Name of DES_OBJECT_4 = 'BUFFER2_Before_Machine'
# ++++++
    DES_OBJECT_4 = TDES_OBJECT(
        TBUFFER,          #Object_Type
        'BUFFER2_Before_Machine',      #Object_Name_str
        6,                #Inputs
        6,                #Outputs
    )

DES_OBJECT_4.DESObject_InputChannel_Index_Selection_Strategy.Set_Item_str_to('TSelection_Cyclical_Selected_Index')
)
    DES_OBJECT_4.DESObject_InputChannel_Index = 0

DES_OBJECT_4.DESObject_OutputChannel_Index_Selection_Strategy.Set_Item_str_to('TSelection_Random_Selected_Index')
    DES_OBJECT_4.DESObject_OutputChannel_Index = 0

    DES_OBJECT_4.BUFFER_Type_Of_Queue.Set_Item_str_to('TQueue_First_In_First_Out')

    DES_OBJECT_4.DESObject_Capacity = 20

```

```

# ++++++
# Name of DES_OBJECT_6 = 'BUFFER3_After_Machine'
# ++++++
    DES_OBJECT_6 = TDES_OBJECT(
        TBUFFER,          #Object_Type
        'BUFFER3_After_Machine',      #Object_Name_str
        6,                #Inputs
        6,                #Outputs
    )

DES_OBJECT_6.DESObject_InputChannel_Index_Selection_Strategy.Set_Item_str_to('TSelection_Random_Selected_Index')
DES_OBJECT_6.DESObject_InputChannel_Index = 0

DES_OBJECT_6.DESObject_OutputChannel_Index_Selection_Strategy.Set_Item_str_to('TSelection_Random_Selected_Index')
DES_OBJECT_6.DESObject_OutputChannel_Index = 0

DES_OBJECT_6.BUFFER_Type_Of_Queue.Set_Item_str_to('TQueue_First_In_First_Out')

DES_OBJECT_6.DESObject_Capacity = 20

# ++++++
# Name of DES_OBJECT_3 = 'LOCK'
# ++++++
    DES_OBJECT_3 = TDES_OBJECT(
        TLOCK,           #Object_Type
        'LOCK',          #Object_Name_str
        1,               #Inputs
        2,               #Outputs
    )

DES_OBJECT_3.LOCK_Entity_Number_Limit_in_Segment = 26
DES_OBJECT_3.LOCK_Maximum_Number_of_Entities_in_Segment = 0
DES_OBJECT_3.LOCK_Actual_Number_of_Entities_in_Segment = 0

```

```

# ++++++
# Name of DES_OBJECT_5 = 'MACHINE1'
# ++++++
    DES_OBJECT_5 = TDES_OBJECT(
        TMACHINE,          #Object_Type
        'MACHINE1',        #Object_Name_str
        6,                 #Inputs
        6,                 #Outputs
    )

DES_OBJECT_5.DESObject_InputChannel_Index_Selection_Strategy.Set_Item_str_to('TSelection_Random_Selected_Index')
    DES_OBJECT_5.DESObject_InputChannel_Index = 0

DES_OBJECT_5.DESObject_OutputChannel_Index_Selection_Strategy.Set_Item_str_to('TSelection_Random_Selected_Index')
    DES_OBJECT_5.DESObject_OutputChannel_Index = 0

    DES_OBJECT_5.MACHINE_Minimum_Of_Time = 1.000
    DES_OBJECT_5.MACHINE_Usual_Of_Time = 2.000
    DES_OBJECT_5.MACHINE_Maximum_Of_Time = 3.000
    DES_OBJECT_5.MACHINE_Deviation_Of_Time = 1.000
    DES_OBJECT_5.MACHINE_Mean_Of_Time = 10.000
    DES_OBJECT_5.MACHINE_Constant_Value_Of_Time = 10.000

    DES_OBJECT_5.MACHINE_Distribution.Set_Item_str_to('TDistribution_Constant_Value')
    """

TDES_Distribution =(
    'TDistribution_Constant_Value',          #=0
    'TDistribution_Exponential_Mean',        #=1
    'TDistribution_Normal_Mean_Deviation',   #=2
    'TDistribution_Triangle_Minimum_Usual_Maximum',  #=3
    'TDistribution_Uniform_Minimum_Maximum' #=4
)
    """
    DES_OBJECT_5.DESObject_Capacity = 1

```

```

# ++++++
# Name of DES_OBJECT_8 = 'SINK1'
# ++++++
    DES_OBJECT_8 = TDES_OBJECT(
        TSINK,          #Object_Type
        'SINK1',        #Object_Name_str
        6,              #Inputs
        0,              #Outputs
    )

# ++++++
# Name of DES_OBJECT_1 = 'SOURCE1'
# ++++++
    DES_OBJECT_1 = TDES_OBJECT(
        TSOURCE,        #Object_Type
        'SOURCE1',      #Object_Name_str
        0,              #Inputs
        6,              #Outputs
    )

DES_OBJECT_1.DESObject_OutputChannel_Index_Selection_Strategy.Set_Item_str_to('TSelection_Random_Selected_Index')
DES_OBJECT_1.DESObject_OutputChannel_Index = 0

DES_OBJECT_1.SOURCE_Minimum_Of_Time = 1.000
DES_OBJECT_1.SOURCE_Usual_Of_Time = 2.000
DES_OBJECT_1.SOURCE_Maximum_Of_Time = 3.000
DES_OBJECT_1.SOURCE_Deviation_Of_Time = 1.000
DES_OBJECT_1.SOURCE_Mean_Of_Time = 8.000
DES_OBJECT_1.SOURCE_Constant_Value_Of_Time = 8.000

DES_OBJECT_1.SOURCE_Distribution.Set_Item_str_to('TDistribution_Constant_Value')
"""
TDES_Distribution =(
    'TDistribution_Constant_Value',      #=0
    'TDistribution_Exponential_Mean',    #=1

```

```

'TDistribution_Normal_Mean_Deviation',  #=2
'TDistribution_Triangle_Minimum_Usual_Maximum',  #=3
'TDistribution_Uniform_Minimum_Maximum'  #=4
)

"""
DES_OBJECT_1.SOURCE_Created_Entity.DESEntity_Name_str = 'Alma'
DES_OBJECT_1.SOURCE_First_Time_of_Entity_Creation = 0.000

DES_OBJECT_1.SOURCE_Maximum_Batch_Size = 2000000000

DES_OBJECT_1.DESObject_Capacity = 1

# ++++++
# Name of DES_OBJECT_7 = 'UNLOCK'
# ++++++
DES_OBJECT_7 = TDES_OBJECT(
    TUNLOCK,          #Object_Type
    'UNLOCK',         #Object_Name_str
    2,                #Inputs
    1,                #Outputs
)

#+++++
#Insert of DES_OBJECT into DESObjectList of DES_BRANCH
Memol_str =Memol_str + CRLF + CRLF

Title_str ='Insert_DES_Object_Into_DES_ObjectList:'
Text_str  =DES_Create_Text_Chain_str(
    len(Title_str),
    '='
)
Memol_str =Memol_str + Title_str + CRLF + Text_str + CRLF

#+++++

```

```
# ~~~~~~  
# Insert of DES_OBJECTS into DESObjectList of DES_BRANCH  
  
# ++++++  
  
Branch.DESBranch_Insert_DESObject_Into_DESObjectList ( DES_OBJECT_2)      # BUFFER1_After_Route  
Branch.DESBranch_Insert_DESObject_Into_DESObjectList ( DES_OBJECT_4)      # BUFFER2_Before_Machine  
Branch.DESBranch_Insert_DESObject_Into_DESObjectList ( DES_OBJECT_6)      # BUFFER3_After_Machine  
Branch.DESBranch_Insert_DESObject_Into_DESObjectList ( DES_OBJECT_3)      # LOCK  
Branch.DESBranch_Insert_DESObject_Into_DESObjectList ( DES_OBJECT_5)      # MACHINE1  
Branch.DESBranch_Insert_DESObject_Into_DESObjectList ( DES_OBJECT_8)      # SINK1  
Branch.DESBranch_Insert_DESObject_Into_DESObjectList ( DES_OBJECT_1)      # SOURCE1  
Branch.DESBranch_Insert_DESObject_Into_DESObjectList ( DES_OBJECT_7)      # UNLOCK  
# ++++++  
  
#++++++  
#Insert of DES_CONNECTIONS into DESConnectionList of DES_BRANCH  
Memol_str =Memol_str + CRLF + CRLF  
Title_str ='Insert_DES_Connection_To_DESConnectionList:'  
Text_str   =DES_Create_Text_Chain_str(  
    len(Title_str),    #unsigned int n,  
    '='               #string text  
)  
Memol_str =Memol_str + Title_str + CRLF + Text_str + CRLF  
#++++++  
  
# #####  
# Insert of DES CONNECTIONS into DESConnectionList of DES BRANCH
```

```

# DESBranch_DESConnectionList [0]
# ++++++
    DES_Connection = TDES_CONNECTION()
    DES_Connection.DESConnection_DESBranch_Name_OUT_str = Branch.DESBranch_Name_str
    DES_Connection.DESConnection_DESObject_Name_OUT_str = 'SOURCE1'
    DES_Connection.DESConnection_DESObject_Channel_Index_OUT = 0

    DES_Connection.DESConnection_DESBranch_Name_IN_str = Branch.DESBranch_Name_str
    DES_Connection.DESConnection_DESObject_Name_IN_str = 'BUFFER1_After_Route'
    DES_Connection.DESConnection_DESObject_Channel_Index_IN = 0

    DES_Connection.DESConnection_Enabled_bool = True

    DES_Connection.DESConnection_TRACED_bool = False

    Branch.DESBranch_Insert_Connection_Into_DESConnectionList(DES_Connection,)
# ++++++

# DESBranch_DESConnectionList [1]
# ++++++
    DES_Connection = TDES_CONNECTION()
    DES_Connection.DESConnection_DESBranch_Name_OUT_str = Branch.DESBranch_Name_str
    DES_Connection.DESConnection_DESObject_Name_OUT_str = 'BUFFER1_After_Route'
    DES_Connection.DESConnection_DESObject_Channel_Index_OUT = 0

    DES_Connection.DESConnection_DESBranch_Name_IN_str = Branch.DESBranch_Name_str
    DES_Connection.DESConnection_DESObject_Name_IN_str = 'LOCK'
    DES_Connection.DESConnection_DESObject_Channel_Index_IN = 0

    DES_Connection.DESConnection_Enabled_bool = True

    DES_Connection.DESConnection_TRACED_bool = False

    Branch.DESBranch_Insert_Connection_Into_DESConnectionList(DES_Connection,)
# ++++++

```



```

# DESBranch_DESConnectionList [2]
# ++++++
    DES_Connection = TDES_CONNECTION()
    DES_Connection.DESConnection_DESBranch_Name_OUT_str = Branch.DESBranch_Name_str
    DES_Connection.DESConnection_DESObject_Name_OUT_str = 'LOCK'
    DES_Connection.DESConnection_DESObject_Channel_Index_OUT = 0

    DES_Connection.DESConnection_DESBranch_Name_IN_str = Branch.DESBranch_Name_str
    DES_Connection.DESConnection_DESObject_Name_IN_str = 'BUFFER2_Before_Machine'
    DES_Connection.DESConnection_DESObject_Channel_Index_IN = 0

    DES_Connection.DESConnection_Enabled_bool = True

    DES_Connection.DESConnection_TRACED_bool = False

    Branch.DESBranch_Insert_Connection_Into_DESConnectionList(DES_Connection,)
# ++++++

# DESBranch_DESConnectionList [3]
# ++++++
    DES_Connection = TDES_CONNECTION()
    DES_Connection.DESConnection_DESBranch_Name_OUT_str = Branch.DESBranch_Name_str
    DES_Connection.DESConnection_DESObject_Name_OUT_str = 'BUFFER2_Before_Machine'
    DES_Connection.DESConnection_DESObject_Channel_Index_OUT = 0

    DES_Connection.DESConnection_DESBranch_Name_IN_str = Branch.DESBranch_Name_str
    DES_Connection.DESConnection_DESObject_Name_IN_str = 'MACHINE1'
    DES_Connection.DESConnection_DESObject_Channel_Index_IN = 0

    DES_Connection.DESConnection_Enabled_bool = True

    DES_Connection.DESConnection_TRACED_bool = False

    Branch.DESBranch_Insert_Connection_Into_DESConnectionList(DES_Connection,)
# ++++++

```

```

# DESBranch_DESConnectionList [4]
# ++++++
    DES_Connection = TDES_CONNECTION()
    DES_Connection.DESConnection_DESBranch_Name_OUT_str = Branch.DESBranch_Name_str
    DES_Connection.DESConnection_DESObject_Name_OUT_str = 'MACHINE1'
    DES_Connection.DESConnection_DESObject_Channel_Index_OUT = 0

    DES_Connection.DESConnection_DESBranch_Name_IN_str = Branch.DESBranch_Name_str
    DES_Connection.DESConnection_DESObject_Name_IN_str = 'BUFFER3_After_Machine'
    DES_Connection.DESConnection_DESObject_Channel_Index_IN = 0

    DES_Connection.DESConnection_Enabled_bool = True

    DES_Connection.DESConnection_TRACED_bool = False

    Branch.DESBranch_Insert_Connection_Into_DESConnectionList(DES_Connection,)
# ++++++

# DESBranch_DESConnectionList [5]
# ++++++
    DES_Connection = TDES_CONNECTION()
    DES_Connection.DESConnection_DESBranch_Name_OUT_str = Branch.DESBranch_Name_str
    DES_Connection.DESConnection_DESObject_Name_OUT_str = 'BUFFER3_After_Machine'
    DES_Connection.DESConnection_DESObject_Channel_Index_OUT = 0

    DES_Connection.DESConnection_DESBranch_Name_IN_str = Branch.DESBranch_Name_str
    DES_Connection.DESConnection_DESObject_Name_IN_str = 'UNLOCK'
    DES_Connection.DESConnection_DESObject_Channel_Index_IN = 0

    DES_Connection.DESConnection_Enabled_bool = True

    DES_Connection.DESConnection_TRACED_bool = False

    Branch.DESBranch_Insert_Connection_Into_DESConnectionList(DES_Connection,)

```

```
# ++++++

# DESBranch_DESConnectionList [6]
# ++++++
    DES_Connection = TDES_CONNECTION()
    DES_Connection.DESConnection_DESBranch_Name_OUT_str = Branch.DESBranch_Name_str
    DES_Connection.DESConnection_DESObject_Name_OUT_str = 'LOCK'
    DES_Connection.DESConnection_DESObject_Channel_Index_OUT = 1

    DES_Connection.DESConnection_DESBranch_Name_IN_str = Branch.DESBranch_Name_str
    DES_Connection.DESConnection_DESObject_Name_IN_str = 'UNLOCK'
    DES_Connection.DESConnection_DESObject_Channel_Index_IN = 1

    DES_Connection.DESConnection_Enabled_bool = True

    DES_Connection.DESConnection_TRACED_bool = False

    Branch.DESBranch_Insert_Connection_Into_DESConnectionList(DES_Connection,)
# ++++++

# DESBranch_DESConnectionList [7]
# ++++++
    DES_Connection = TDES_CONNECTION()
    DES_Connection.DESConnection_DESBranch_Name_OUT_str = Branch.DESBranch_Name_str
    DES_Connection.DESConnection_DESObject_Name_OUT_str = 'UNLOCK'
    DES_Connection.DESConnection_DESObject_Channel_Index_OUT = 0

    DES_Connection.DESConnection_DESBranch_Name_IN_str = Branch.DESBranch_Name_str
    DES_Connection.DESConnection_DESObject_Name_IN_str = 'SINK1'
    DES_Connection.DESConnection_DESObject_Channel_Index_IN = 0

    DES_Connection.DESConnection_Enabled_bool = True

    DES_Connection.DESConnection_TRACED_bool = False
```

[illegible]

5.2.2 DES_Modell_02 TDES_OBJECT list

Local time :Fri Oct 23 08:24:27 2020

Model_Name : UM_Model_02

UM_Model_02.Print ObjectList Short:

Number of DESObjects = 8

GTime_Now [DDD:HH:MM:SS.XXX] = 0:00:20:08.000

```

=====
UM_Model_02.DESObjectList[    i] =          DESObject_Name  DESObject_Type      State
Last_Calculation_Time      DESObject_Content
=====
=====
UM_Model_02.DESObjectList[    0] =          BUFFER1_After_Route      TBUFFER      TIdle
0:00:20:00.000      >x,x,x,x,x,x>-[#187, #186, #185, #184, #183]->#182,x,x,x,x,x>      (Buffer is NOT EMPTY!
Capacity = 20      Occupancy = 25.00%)
UM_Model_02.DESObjectList[    1] =          BUFFER2_Before_Machine      TBUFFER      TBlocked
0:00:20:00.000      >{x},{x},{x},{x},{x},{x}>-[#178, #177, #176, #175, #174, #173, #172, #171, #170, #169,
#168, #167, #166, #165, #164, #163, #162, #161, #160]->#159,x,x,x,x,x>
(Buffer is NOT EMPTY!      Capacity = 20      Occupancy = 95.00%)
UM_Model_02.DESObjectList[    2] =          BUFFER3_After_Machine      TBUFFER      TIdle
0:00:20:00.000      >x,x,x,x,x,x>-[x]->x,x,x,x,x,x>      (Buffer is EMPTY      Capacity = 20)
UM_Model_02.DESObjectList[    3] =          LOCK      TLOCK      TBusy
0:00:19:50.000      >#181>-[#180]->#179,x>(Segment's maximum Entity content = 25)
UM_Model_02.DESObjectList[    4] =          MACHINE1      TMACHINE      TBusy
0:00:20:00.000      >#158,x,x,x,x,x>-[#157]->x,x,x,x,x,x>      (Capacity = 1)
UM_Model_02.DESObjectList[    5] =          SINK1      TSINK      TIdle
0:00:20:00.000      >x,x,x,x,x,x>-[x]->nil>
UM_Model_02.DESObjectList[    6] =          SOURCE1      TSOURCE      TIdle
0:00:20:08.000      >nil>-[x]->#188,x,x,x,x,x>      (Capacity = 1)

```

UM_Model_02.DESObjectList[7] =	UNLOCK	TUNLOCK	Tidle
0:00:20:00.000 >x,x>-[x]->x>			

UM_Model_02.Print_DESObjectList:

=====

Number of DESObjects = 8

GTime_Now [DDD:HH:MM:SS.XXX] = 0:00:20:08.000

#####

UM_Model_02.DESBranch_DESObjectList[0]

TBUFFER_start_TBUFFER_start_TBUFFER_start_TBUFFER_start_TBUFFER_start_TBUFFER_
+++++

UM_Model_02.BUFFER1_After_Route.BUFFER_Type_Of_Queue =TQueue_First_In_First_Out
UM_Model_02.BUFFER1_After_Route.BUFFER_Maximum_Content =0

UM_Model_02.BUFFER1_After_Route.BUFFER_Last_Calculation_Time = 0:00:20:00.000
.....

UM_Model_02.BUFFER1_After_Route.DESObject_Owner_class =<TDES_BRANCH.TDES_BRANCH object at 0x00000214A09B25B0>
(UM_Model_02)

UM_Model_02.BUFFER1_After_Route.DESObject_Name_str =BUFFER1_After_Route
UM_Model_02.BUFFER1_After_Route.DESObject_ID_Number =12
UM_Model_02.BUFFER1_After_Route.DESObject_Type =TBUFFER

UM_Model_02.BUFFER1_After_Route.DESObject_Priority_To_DESEntity_From_DESObject =0
UM_Model_02.BUFFER1_After_Route.DESBranch_Name_str =UM_Model_02

UM_Model_02.BUFFER1_After_Route.DESObject_Commanded_State_In_Previous_Step =TCommanded_Enabled_State

```

UM_Model_02.BUFFER1_After_Route.DESObject_Commanded_State =TCommanded_Enabled_State

UM_Model_02.BUFFER1_After_Route.DESObject_Work_State =TIdle
UM_Model_02.BUFFER1_After_Route.DESObject_Work_State_In_Previous_Step =TIdle
UM_Model_02.BUFFER1_After_Route.DESObject_Work_State_Before_Fail_Or_Pause =TIdle

UM_Model_02.BUFFER1_After_Route.Time_Percent_In_Statuses[  TIdle] =100.000
UM_Model_02.BUFFER1_After_Route.Time_Percent_In_Statuses[  TBusy] =  0.000
UM_Model_02.BUFFER1_After_Route.Time_Percent_In_Statuses[TBlocked] =  0.000
UM_Model_02.BUFFER1_After_Route.Time_Percent_In_Statuses[ TFailed] =  0.000
UM_Model_02.BUFFER1_After_Route.Time_Percent_In_Statuses[ TPaused] =  0.000

UM_Model_02.BUFFER1_After_Route.System_Attributes[  i] = Name
Value
UM_Model_02.BUFFER1_After_Route.System_Attributes[  0] = WORKED_Entity_Sample_Number
146
UM_Model_02.BUFFER1_After_Route.System_Attributes[  1] = WORKED_Entity_Sample_Summa
62.0
UM_Model_02.BUFFER1_After_Route.System_Attributes[  2] = WORKED_Entity_Average_Staying_Time_in_DESObject
0:00:00:00.425
UM_Model_02.BUFFER1_After_Route.System_Attributes[  3] = WORKED_Entity_Maximal_Number_in_DESObject
5 [entities]
UM_Model_02.BUFFER1_After_Route.System_Attributes[  4] = WORKED_Entity_Queue_Sample_Number
146
UM_Model_02.BUFFER1_After_Route.System_Attributes[  5] = WORKED_Entity_Number_in_Queue_Summa
46.0
UM_Model_02.BUFFER1_After_Route.System_Attributes[  6] = WORKED_Entity_Average_Number_in_DESObject
0.315 [entities]
UM_Model_02.BUFFER1_After_Route.System_Attributes[  7] = WORKED_Entity_Through_Output_Rate at Output_Channel[0]
0.1218487 [entity/seconds]
UM_Model_02.BUFFER1_After_Route.System_Attributes[  8] = WORKED_Entity_Produce_Time at Output_Channel[0]
8.2068966 [seconds/entity]

UM_Model_02.BUFFER1_After_Route.First_Calculation? =False

UM_Model_02.BUFFER1_After_Route.InputChannel_Index_Selection_Strategy =TSelection_Random_Selected_Index
UM_Model_02.BUFFER1_After_Route.InputChannel_Index =0

```

```
UM_Model_02.BUFFER1_After_Route.Number_Of_InputChannels =6

UM_Model_02.BUFFER1_After_Route.Input [ 0].Data =#Empty
UM_Model_02.BUFFER1_After_Route.Input [ 0].Channel_Is_Enabled =True
UM_Model_02.BUFFER1_After_Route.Input [ 0].Channel_Is_Connected =True    (#_of_Entities= 151)

UM_Model_02.BUFFER1_After_Route.Input [ 1].Data =#Empty
UM_Model_02.BUFFER1_After_Route.Input [ 1].Channel_Is_Enabled =True
UM_Model_02.BUFFER1_After_Route.Input [ 1].Channel_Is_Connected =False    (#_of_Entities= 0)

UM_Model_02.BUFFER1_After_Route.Input [ 2].Data =#Empty
UM_Model_02.BUFFER1_After_Route.Input [ 2].Channel_Is_Enabled =True
UM_Model_02.BUFFER1_After_Route.Input [ 2].Channel_Is_Connected =False    (#_of_Entities= 0)

UM_Model_02.BUFFER1_After_Route.Input [ 3].Data =#Empty
UM_Model_02.BUFFER1_After_Route.Input [ 3].Channel_Is_Enabled =True
UM_Model_02.BUFFER1_After_Route.Input [ 3].Channel_Is_Connected =False    (#_of_Entities= 0)

UM_Model_02.BUFFER1_After_Route.Input [ 4].Data =#Empty
UM_Model_02.BUFFER1_After_Route.Input [ 4].Channel_Is_Enabled =True
UM_Model_02.BUFFER1_After_Route.Input [ 4].Channel_Is_Connected =False    (#_of_Entities= 0)

UM_Model_02.BUFFER1_After_Route.Input [ 5].Data =#Empty
UM_Model_02.BUFFER1_After_Route.Input [ 5].Channel_Is_Enabled =True
UM_Model_02.BUFFER1_After_Route.Input [ 5].Channel_Is_Connected =False    (#_of_Entities= 0)

UM_Model_02.BUFFER1_After_Route.Capacity =20
UM_Model_02.BUFFER1_After_Route.Number_Of_Content_Entities =5
UM_Model_02.BUFFER1_After_Route.Content_Entities_Vector[ 0] =#183
UM_Model_02.BUFFER1_After_Route.Content_Entities_Vector[ 1] =#184
UM_Model_02.BUFFER1_After_Route.Content_Entities_Vector[ 2] =#185
UM_Model_02.BUFFER1_After_Route.Content_Entities_Vector[ 3] =#186
UM_Model_02.BUFFER1_After_Route.Content_Entities_Vector[ 4] =#187

UM_Model_02.BUFFER1_After_Route.OutputChannel_Index_Selection_Strategy =TSelection_Random_Selected_Index
UM_Model_02.BUFFER1_After_Route.OutputChannel_Index =0

UM_Model_02.BUFFER1_After_Route.Number_Of_OutputChannels =6
```



```
UM_Model_02.BUFFER1_After_Route.Output [ 0].Data =#Alma_(#182)
UM_Model_02.BUFFER1_After_Route.Output [ 0].Channel_Is_Enabled =True
UM_Model_02.BUFFER1_After_Route.Output [ 0].Channel_Is_Connected =True    (#_of_Entities= 145)

UM_Model_02.BUFFER1_After_Route.Output [ 1].Data =#Empty
UM_Model_02.BUFFER1_After_Route.Output [ 1].Channel_Is_Enabled =True
UM_Model_02.BUFFER1_After_Route.Output [ 1].Channel_Is_Connected =False    (#_of_Entities= 0)

UM_Model_02.BUFFER1_After_Route.Output [ 2].Data =#Empty
UM_Model_02.BUFFER1_After_Route.Output [ 2].Channel_Is_Enabled =True
UM_Model_02.BUFFER1_After_Route.Output [ 2].Channel_Is_Connected =False    (#_of_Entities= 0)

UM_Model_02.BUFFER1_After_Route.Output [ 3].Data =#Empty
UM_Model_02.BUFFER1_After_Route.Output [ 3].Channel_Is_Enabled =True
UM_Model_02.BUFFER1_After_Route.Output [ 3].Channel_Is_Connected =False    (#_of_Entities= 0)

UM_Model_02.BUFFER1_After_Route.Output [ 4].Data =#Empty
UM_Model_02.BUFFER1_After_Route.Output [ 4].Channel_Is_Enabled =True
UM_Model_02.BUFFER1_After_Route.Output [ 4].Channel_Is_Connected =False    (#_of_Entities= 0)

UM_Model_02.BUFFER1_After_Route.Output [ 5].Data =#Empty
UM_Model_02.BUFFER1_After_Route.Output [ 5].Channel_Is_Enabled =True
UM_Model_02.BUFFER1_After_Route.Output [ 5].Channel_Is_Connected =False    (#_of_Entities= 0)
```

TBUFFER_end_TBUFFER_end_TBUFFER_end_TBUFFER_end_TBUFFER_end_TBUFFER_end_TBUFFER_

```
#####
#####
UM_Model_02.DESBranch_DESObjectList[    1]
```

TBUFFER_start_TBUFFER_start_TBUFFER_start_TBUFFER_start_TBUFFER_start_TBUFFER_
+++++

```

UM_Model_02.BUFFER2_Before_Machine.BUFFER_Type_Of_Queue =TQueue_First_In_First_Out
UM_Model_02.BUFFER2_Before_Machine.BUFFER_Maximum_Content =0

UM_Model_02.BUFFER2_Before_Machine.BUFFER_Last_Calculation_Time = 0:00:20:00.000
.....

UM_Model_02.BUFFER2_Before_Machine.DESObject_Owner_class =<TDES_BRANCH.TDES_BRANCH object at 0x00000214A09B25B0>
(UM_Model_02)

UM_Model_02.BUFFER2_Before_Machine.DESObject_Name_str =BUFFER2_Before_Machine
UM_Model_02.BUFFER2_Before_Machine.DESObject_ID_Number =13
UM_Model_02.BUFFER2_Before_Machine.DESObject_Type =TBUFFER

UM_Model_02.BUFFER2_Before_Machine.DESObject_Priority_To_DESEntity_From_DESObject =0
UM_Model_02.BUFFER2_Before_Machine.DESBranch_Name_str =UM_Model_02

UM_Model_02.BUFFER2_Before_Machine.DESObject_Commanded_State_In_Previous_Step =TCommanded_Enabled_State
UM_Model_02.BUFFER2_Before_Machine.DESObject_Commanded_State =TCommanded_Enabled_State

UM_Model_02.BUFFER2_Before_Machine.DESObject_Work_State =TBlocked
UM_Model_02.BUFFER2_Before_Machine.DESObject_Work_State_In_Previous_Step =TBlocked
UM_Model_02.BUFFER2_Before_Machine.DESObject_Work_State_Before_Fail_Or_Pause =TBlocked

UM_Model_02.BUFFER2_Before_Machine.Time_Percent_In_Statuses[ TIdle] = 89.073
UM_Model_02.BUFFER2_Before_Machine.Time_Percent_In_Statuses[ TBusy] = 0.000
UM_Model_02.BUFFER2_Before_Machine.Time_Percent_In_Statuses[TBlocked] = 10.927
UM_Model_02.BUFFER2_Before_Machine.Time_Percent_In_Statuses[ TFailed] = 0.000
UM_Model_02.BUFFER2_Before_Machine.Time_Percent_In_Statuses[ TPaused] = 0.000

UM_Model_02.BUFFER2_Before_Machine.System_Attributes[ i] = Name
Value
UM_Model_02.BUFFER2_Before_Machine.System_Attributes[ 0] = WORKED_Entity_Sample_Number
123
UM_Model_02.BUFFER2_Before_Machine.System_Attributes[ 1] = WORKED_Entity_Sample_Summa
1002.0
UM_Model_02.BUFFER2_Before_Machine.System_Attributes[ 2] = WORKED_Entity_Average_Staying_Time_in_DESObject
0:00:00:08.146

```

```

UM_Model_02.BUFFER2_Before_Machine.System_Attributes[ 3] = WORKED_Entity_Maximal_Number_in_DESObject
19 [entities]
UM_Model_02.BUFFER2_Before_Machine.System_Attributes[ 4] = WORKED_Entity_Queue_Sample_Number
123
UM_Model_02.BUFFER2_Before_Machine.System_Attributes[ 5] = WORKED_Entity_Number_in_Queue_Summa
1338.0
UM_Model_02.BUFFER2_Before_Machine.System_Attributes[ 6] = WORKED_Entity_Average_Number_in_DESObject
10.878 [entities]
UM_Model_02.BUFFER2_Before_Machine.System_Attributes[ 7] = WORKED_Entity_Through_Output_Rate at
Output_Channel[0] 0.1016667 [entity/seconds]
UM_Model_02.BUFFER2_Before_Machine.System_Attributes[ 8] = WORKED_Entity_Produce_Time at Output_Channel[0]
9.8360656 [seconds/entity]

```

```

UM_Model_02.BUFFER2_Before_Machine.First_Calculation? =False

```

```

UM_Model_02.BUFFER2_Before_Machine.InputChannel_Index_Selection_Strategy =TSelection_Cyclical_Selected_Index
UM_Model_02.BUFFER2_Before_Machine.InputChannel_Index =0

```

```

UM_Model_02.BUFFER2_Before_Machine.Number_Of_InputChannels =6

```

```

UM_Model_02.BUFFER2_Before_Machine.Input [ 0].Data =#Empty
UM_Model_02.BUFFER2_Before_Machine.Input [ 0].Channel_Is_Enabled =False
UM_Model_02.BUFFER2_Before_Machine.Input [ 0].Channel_Is_Connected =True (#_of_Entities= 142)

```

```

UM_Model_02.BUFFER2_Before_Machine.Input [ 1].Data =#Empty
UM_Model_02.BUFFER2_Before_Machine.Input [ 1].Channel_Is_Enabled =False
UM_Model_02.BUFFER2_Before_Machine.Input [ 1].Channel_Is_Connected =False (#_of_Entities= 0)

```

```

UM_Model_02.BUFFER2_Before_Machine.Input [ 2].Data =#Empty
UM_Model_02.BUFFER2_Before_Machine.Input [ 2].Channel_Is_Enabled =False
UM_Model_02.BUFFER2_Before_Machine.Input [ 2].Channel_Is_Connected =False (#_of_Entities= 0)

```

```

UM_Model_02.BUFFER2_Before_Machine.Input [ 3].Data =#Empty
UM_Model_02.BUFFER2_Before_Machine.Input [ 3].Channel_Is_Enabled =False
UM_Model_02.BUFFER2_Before_Machine.Input [ 3].Channel_Is_Connected =False (#_of_Entities= 0)

```

```

UM_Model_02.BUFFER2_Before_Machine.Input [ 4].Data =#Empty
UM_Model_02.BUFFER2_Before_Machine.Input [ 4].Channel_Is_Enabled =False

```

```
UM_Model_02.BUFFER2_Before_Machine.Input [ 4].Channel_Is_Connected =False    (#_of_Entities= 0)

UM_Model_02.BUFFER2_Before_Machine.Input [ 5].Data =#Empty
UM_Model_02.BUFFER2_Before_Machine.Input [ 5].Channel_Is_Enabled =False
UM_Model_02.BUFFER2_Before_Machine.Input [ 5].Channel_Is_Connected =False    (#_of_Entities= 0)

UM_Model_02.BUFFER2_Before_Machine.Capacity =20
UM_Model_02.BUFFER2_Before_Machine.Number_Of_Content_Entities =19
UM_Model_02.BUFFER2_Before_Machine.Content_Entities_Vector[ 0] =#160
UM_Model_02.BUFFER2_Before_Machine.Content_Entities_Vector[ 1] =#161
UM_Model_02.BUFFER2_Before_Machine.Content_Entities_Vector[ 2] =#162
UM_Model_02.BUFFER2_Before_Machine.Content_Entities_Vector[ 3] =#163
UM_Model_02.BUFFER2_Before_Machine.Content_Entities_Vector[ 4] =#164
UM_Model_02.BUFFER2_Before_Machine.Content_Entities_Vector[ 5] =#165
UM_Model_02.BUFFER2_Before_Machine.Content_Entities_Vector[ 6] =#166
UM_Model_02.BUFFER2_Before_Machine.Content_Entities_Vector[ 7] =#167
UM_Model_02.BUFFER2_Before_Machine.Content_Entities_Vector[ 8] =#168
UM_Model_02.BUFFER2_Before_Machine.Content_Entities_Vector[ 9] =#169
UM_Model_02.BUFFER2_Before_Machine.Content_Entities_Vector[ 10] =#170
UM_Model_02.BUFFER2_Before_Machine.Content_Entities_Vector[ 11] =#171
UM_Model_02.BUFFER2_Before_Machine.Content_Entities_Vector[ 12] =#172
UM_Model_02.BUFFER2_Before_Machine.Content_Entities_Vector[ 13] =#173
UM_Model_02.BUFFER2_Before_Machine.Content_Entities_Vector[ 14] =#174
UM_Model_02.BUFFER2_Before_Machine.Content_Entities_Vector[ 15] =#175
UM_Model_02.BUFFER2_Before_Machine.Content_Entities_Vector[ 16] =#176
UM_Model_02.BUFFER2_Before_Machine.Content_Entities_Vector[ 17] =#177
UM_Model_02.BUFFER2_Before_Machine.Content_Entities_Vector[ 18] =#178

UM_Model_02.BUFFER2_Before_Machine.OutputChannel_Index_Selection_Strategy =TSelection_Random_Selected_Index
UM_Model_02.BUFFER2_Before_Machine.OutputChannel_Index =0

UM_Model_02.BUFFER2_Before_Machine.Number_Of_OutputChannels =6

UM_Model_02.BUFFER2_Before_Machine.Output [ 0].Data =#Alma_ (#159)
UM_Model_02.BUFFER2_Before_Machine.Output [ 0].Channel_Is_Enabled =True
UM_Model_02.BUFFER2_Before_Machine.Output [ 0].Channel_Is_Connected =True    (#_of_Entities= 122)

UM_Model_02.BUFFER2_Before_Machine.Output [ 1].Data =#Empty
UM_Model_02.BUFFER2_Before_Machine.Output [ 1].Channel_Is_Enabled =True
```

```
UM_Model_02.BUFFER2_Before_Machine.Output [ 1].Channel_Is_Connected =False    (#_of_Entities= 0)

UM_Model_02.BUFFER2_Before_Machine.Output [ 2].Data =#Empty
UM_Model_02.BUFFER2_Before_Machine.Output [ 2].Channel_Is_Enabled =True
UM_Model_02.BUFFER2_Before_Machine.Output [ 2].Channel_Is_Connected =False    (#_of_Entities= 0)

UM_Model_02.BUFFER2_Before_Machine.Output [ 3].Data =#Empty
UM_Model_02.BUFFER2_Before_Machine.Output [ 3].Channel_Is_Enabled =True
UM_Model_02.BUFFER2_Before_Machine.Output [ 3].Channel_Is_Connected =False    (#_of_Entities= 0)

UM_Model_02.BUFFER2_Before_Machine.Output [ 4].Data =#Empty
UM_Model_02.BUFFER2_Before_Machine.Output [ 4].Channel_Is_Enabled =True
UM_Model_02.BUFFER2_Before_Machine.Output [ 4].Channel_Is_Connected =False    (#_of_Entities= 0)

UM_Model_02.BUFFER2_Before_Machine.Output [ 5].Data =#Empty
UM_Model_02.BUFFER2_Before_Machine.Output [ 5].Channel_Is_Enabled =True
UM_Model_02.BUFFER2_Before_Machine.Output [ 5].Channel_Is_Connected =False    (#_of_Entities= 0)
```

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#####

#####

UM_Model_02.DESBranch_DESObjectList[2]

TBUFFER_start_TBUFFER_start_TBUFFER_start_TBUFFER_start_TBUFFER_start_TBUFFER_

+++++

UM_Model_02.BUFFER3_After_Machine.BUFFER_Type_Of_Queue =TQueue_First_In_First_Out

UM_Model_02.BUFFER3_After_Machine.BUFFER_Maximum_Content =0

UM_Model_02.BUFFER3_After_Machine.BUFFER_Last_Calculation_Time = 0:00:20:00.000

.....

```

UM_Model_02.BUFFER3_After_Machine.DESObject_Owner_class =<TDES_BRANCH.TDES_BRANCH object at 0x00000214A09B25B0>
(UM_Model_02)

UM_Model_02.BUFFER3_After_Machine.DESObject_Name_str =BUFFER3_After_Machine
UM_Model_02.BUFFER3_After_Machine.DESObject_ID_Number =14
UM_Model_02.BUFFER3_After_Machine.DESObject_Type =TBUFFER

UM_Model_02.BUFFER3_After_Machine.DESObject_Priority_To_DESEntity_From_DESObject =0
UM_Model_02.BUFFER3_After_Machine.DESBranch_Name_str =UM_Model_02

UM_Model_02.BUFFER3_After_Machine.DESObject_Commanded_State_In_Previous_Step =TCommanded_Enabled_State
UM_Model_02.BUFFER3_After_Machine.DESObject_Commanded_State =TCommanded_Enabled_State

UM_Model_02.BUFFER3_After_Machine.DESObject_Work_State =TIdle
UM_Model_02.BUFFER3_After_Machine.DESObject_Work_State_In_Previous_Step =TIdle
UM_Model_02.BUFFER3_After_Machine.DESObject_Work_State_Before_Fail_Or_Pause =TIdle

UM_Model_02.BUFFER3_After_Machine.Time_Percent_In_Statuses[  TIdle] =100.000
UM_Model_02.BUFFER3_After_Machine.Time_Percent_In_Statuses[  TBusy] =  0.000
UM_Model_02.BUFFER3_After_Machine.Time_Percent_In_Statuses[ TBlocked] =  0.000
UM_Model_02.BUFFER3_After_Machine.Time_Percent_In_Statuses[ TFailed] =  0.000
UM_Model_02.BUFFER3_After_Machine.Time_Percent_In_Statuses[ TPaused] =  0.000

UM_Model_02.BUFFER3_After_Machine.System_Attributes[  i] = Name
Value
UM_Model_02.BUFFER3_After_Machine.System_Attributes[  0] = WORKED_Entity_Sample_Number
120
UM_Model_02.BUFFER3_After_Machine.System_Attributes[  1] = WORKED_Entity_Sample_Summa
0.0
UM_Model_02.BUFFER3_After_Machine.System_Attributes[  2] = WORKED_Entity_Average_Staying_Time_in_DESObject
0:00:00:00.000
UM_Model_02.BUFFER3_After_Machine.System_Attributes[  3] = WORKED_Entity_Maximal_Number_in_DESObject
0 [entities]
UM_Model_02.BUFFER3_After_Machine.System_Attributes[  4] = WORKED_Entity_Queue_Sample_Number
120
UM_Model_02.BUFFER3_After_Machine.System_Attributes[  5] = WORKED_Entity_Number_in_Queue_Summa
0.0

```

```
UM_Model_02.BUFFER3_After_Machine.System_Attributes[ 6] = WORKED_Entity_Average_Number_in_DESObject
0.000 [entities]
UM_Model_02.BUFFER3_After_Machine.System_Attributes[ 7] = WORKED_Entity_Through_Output_Rate at
Output_Channel[0] 0.0991667 [entity/seconds]
UM_Model_02.BUFFER3_After_Machine.System_Attributes[ 8] = WORKED_Entity_Produce_Time at Output_Channel[0]
10.0840336 [seconds/entity]

UM_Model_02.BUFFER3_After_Machine.First_Calculation? =False

UM_Model_02.BUFFER3_After_Machine.InputChannel_Index_Selection_Strategy =TSelection_Random_Selected_Index
UM_Model_02.BUFFER3_After_Machine.InputChannel_Index =0

UM_Model_02.BUFFER3_After_Machine.Number_Of_InputChannels =6

UM_Model_02.BUFFER3_After_Machine.Input [ 0].Data =#Empty
UM_Model_02.BUFFER3_After_Machine.Input [ 0].Channel_Is_Enabled =True
UM_Model_02.BUFFER3_After_Machine.Input [ 0].Channel_Is_Connected =True (#_of_Entities= 120)

UM_Model_02.BUFFER3_After_Machine.Input [ 1].Data =#Empty
UM_Model_02.BUFFER3_After_Machine.Input [ 1].Channel_Is_Enabled =True
UM_Model_02.BUFFER3_After_Machine.Input [ 1].Channel_Is_Connected =False (#_of_Entities= 0)

UM_Model_02.BUFFER3_After_Machine.Input [ 2].Data =#Empty
UM_Model_02.BUFFER3_After_Machine.Input [ 2].Channel_Is_Enabled =True
UM_Model_02.BUFFER3_After_Machine.Input [ 2].Channel_Is_Connected =False (#_of_Entities= 0)

UM_Model_02.BUFFER3_After_Machine.Input [ 3].Data =#Empty
UM_Model_02.BUFFER3_After_Machine.Input [ 3].Channel_Is_Enabled =True
UM_Model_02.BUFFER3_After_Machine.Input [ 3].Channel_Is_Connected =False (#_of_Entities= 0)

UM_Model_02.BUFFER3_After_Machine.Input [ 4].Data =#Empty
UM_Model_02.BUFFER3_After_Machine.Input [ 4].Channel_Is_Enabled =True
UM_Model_02.BUFFER3_After_Machine.Input [ 4].Channel_Is_Connected =False (#_of_Entities= 0)

UM_Model_02.BUFFER3_After_Machine.Input [ 5].Data =#Empty
UM_Model_02.BUFFER3_After_Machine.Input [ 5].Channel_Is_Enabled =True
UM_Model_02.BUFFER3_After_Machine.Input [ 5].Channel_Is_Connected =False (#_of_Entities= 0)
```

```

UM_Model_02.BUFFER3_After_Machine.Capacity =20
UM_Model_02.BUFFER3_After_Machine.Number_Of_Content_Entities =0

UM_Model_02.BUFFER3_After_Machine.OutputChannel_Index_Selection_Strategy =TSelection_Random_Selected_Index
UM_Model_02.BUFFER3_After_Machine.OutputChannel_Index =0

UM_Model_02.BUFFER3_After_Machine.Number_Of_OutputChannels =6

UM_Model_02.BUFFER3_After_Machine.Output [ 0].Data =#Empty
UM_Model_02.BUFFER3_After_Machine.Output [ 0].Channel_Is_Enabled =True
UM_Model_02.BUFFER3_After_Machine.Output [ 0].Channel_Is_Connected =True      (#_of_Entities= 120)

UM_Model_02.BUFFER3_After_Machine.Output [ 1].Data =#Empty
UM_Model_02.BUFFER3_After_Machine.Output [ 1].Channel_Is_Enabled =True
UM_Model_02.BUFFER3_After_Machine.Output [ 1].Channel_Is_Connected =False    (#_of_Entities= 0)

UM_Model_02.BUFFER3_After_Machine.Output [ 2].Data =#Empty
UM_Model_02.BUFFER3_After_Machine.Output [ 2].Channel_Is_Enabled =True
UM_Model_02.BUFFER3_After_Machine.Output [ 2].Channel_Is_Connected =False    (#_of_Entities= 0)

UM_Model_02.BUFFER3_After_Machine.Output [ 3].Data =#Empty
UM_Model_02.BUFFER3_After_Machine.Output [ 3].Channel_Is_Enabled =True
UM_Model_02.BUFFER3_After_Machine.Output [ 3].Channel_Is_Connected =False    (#_of_Entities= 0)

UM_Model_02.BUFFER3_After_Machine.Output [ 4].Data =#Empty
UM_Model_02.BUFFER3_After_Machine.Output [ 4].Channel_Is_Enabled =True
UM_Model_02.BUFFER3_After_Machine.Output [ 4].Channel_Is_Connected =False    (#_of_Entities= 0)

UM_Model_02.BUFFER3_After_Machine.Output [ 5].Data =#Empty
UM_Model_02.BUFFER3_After_Machine.Output [ 5].Channel_Is_Enabled =True
UM_Model_02.BUFFER3_After_Machine.Output [ 5].Channel_Is_Connected =False    (#_of_Entities= 0)

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UM_Model_02.DESBranch_DESObjectList[    3]

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UM_Model_02.LOCK.LOCK_Time_Of_Next_Launching =  0:00:19:50.000
UM_Model_02.LOCK.LOCK_Time_Step =  0:00:00:00.000

UM_Model_02.LOCK.LOCK_Entity_Number_Limit_in_Segment      =  26
UM_Model_02.LOCK.LOCK_Maximum_Number_of_Entities_in_Segment =  25
UM_Model_02.LOCK.LOCK_Actual_Number_of_Entities_in_Segment =  24

UM_Model_02.LOCK.LOCK_Last_Calculation_Time =  0:00:19:50.000
.....

UM_Model_02.LOCK.DESObject_Owner_class =<TDES_BRANCH.TDES_BRANCH object at 0x00000214A09B25B0>    (UM_Model_02)

UM_Model_02.LOCK.DESObject_Name_str =LOCK
UM_Model_02.LOCK.DESObject_ID_Number =15
UM_Model_02.LOCK.DESObject_Type =TLOCK

UM_Model_02.LOCK.DESObject_Priority_To_DESEntity_From_DESObject =0
UM_Model_02.LOCK.DESBranch_Name_str =UM_Model_02

UM_Model_02.LOCK.DESObject_Commanded_State_In_Previous_Step =TCommanded_Enabled_State
UM_Model_02.LOCK.DESObject_Commanded_State =TCommanded_Enabled_State

UM_Model_02.LOCK.DESObject_Work_State =TBusy
UM_Model_02.LOCK.DESObject_Work_State_In_Previous_Step =TBusy
UM_Model_02.LOCK.DESObject_Work_State_Before_Fail_Or_Pause =TBusy

UM_Model_02.LOCK.Time_Percent_In_Statuses[    TIdle] =  0.000
UM_Model_02.LOCK.Time_Percent_In_Statuses[    TBusy] = 77.815
UM_Model_02.LOCK.Time_Percent_In_Statuses[TBlocked] = 22.185
UM_Model_02.LOCK.Time_Percent_In_Statuses[ TFailed] =  0.000
```

UM_Model_02.LOCK.Time_Percent_In_Statuses[TPaused] = 0.000

		Value
UM_Model_02.LOCK.System_Attributes[i]	= Name	
UM_Model_02.LOCK.System_Attributes[0]	= WORKED_Entity_Sample_Number	143
UM_Model_02.LOCK.System_Attributes[1]	= WORKED_Entity_Sample_Summa	268.0
UM_Model_02.LOCK.System_Attributes[2]	= WORKED_Entity_Average_Staying_Time_in_DESObject	
0:00:00:01.874		
UM_Model_02.LOCK.System_Attributes[3]	= WORKED_Entity_Through_Output_Rate at Output_Channel[0]	
0.1193277 [entity/seconds]		
UM_Model_02.LOCK.System_Attributes[4]	= WORKED_Entity_Produce_Time at Output_Channel[0]	
8.3802817 [seconds/entity]		

UM_Model_02.LOCK.First_Calculation? =False

UM_Model_02.LOCK.InputChannel_Index_Selection_Strategy =TSelection_Constant_Index

UM_Model_02.LOCK.InputChannel_Index =0

UM_Model_02.LOCK.Number_Of_InputChannels =1

UM_Model_02.LOCK.Input [0].Data =#Alma_(#181)

UM_Model_02.LOCK.Input [0].Channel_Is_Enabled =True

UM_Model_02.LOCK.Input [0].Channel_Is_Connected =True (#_of_Entities= 145)

UM_Model_02.LOCK.Capacity =1

UM_Model_02.LOCK.Number_Of_Content_Entities =1

UM_Model_02.LOCK.Content_Entities_Vector[0] =#180

UM_Model_02.LOCK.OutputChannel_Index_Selection_Strategy =TSelection_Constant_Index

UM_Model_02.LOCK.OutputChannel_Index =0

UM_Model_02.LOCK.Number_Of_OutputChannels =2

UM_Model_02.LOCK.Output [0].Data =#Alma_(#179)

UM_Model_02.LOCK.Output [0].Channel_Is_Enabled =True

UM_Model_02.LOCK.Output [0].Channel_Is_Connected =True (#_of_Entities= 142)

UM_Model_02.LOCK.Output [1].Data =#Empty

UM_Model_02.LOCK.Output [1].Channel_Is_Enabled =True

```
UM_Model_02.LOCK.Output [ 1].Channel_Is_Connected =True    (#_of_Entities= 0)
```

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UM_Model_02.DESBranch_DESObjectList[      4]
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```
UM_Model_02.MACHINE1.MACHINE_Time_Of_Next_Launching =  0:00:20:00.000
```

```
UM_Model_02.MACHINE1.MACHINE_Time_Step =  0:00:00:00.000
```

```
UM_Model_02.MACHINE1.MACHINE_Distribution =TDistribution_Constant_Value
```

```
UM_Model_02.MACHINE1.MACHINE_Constant_Value_Of_Time =  0:00:00:00.000
```

```
UM_Model_02.MACHINE1.MACHINE_Mean_Of_Time =  0:00:00:00.000
```

```
UM_Model_02.MACHINE1.MACHINE_Deviation_Of_Time =  0:00:00:01.000
```

```
UM_Model_02.MACHINE1.MACHINE_Maximum_Of_Time =  0:00:00:03.000
```

```
UM_Model_02.MACHINE1.MACHINE_Usual_Of_Time =  0:00:00:02.000
```

```
UM_Model_02.MACHINE1.MACHINE_Minimum_Of_Time =  0:00:00:01.000
```

```
UM_Model_02.MACHINE1.MACHINE_Utilization =100.000 [%]
```

```
UM_Model_02.MACHINE1.MACHINE_Last_Calculation_Time =  0:00:20:00.000
```

```
.....
```

```
UM_Model_02.MACHINE1.DESObject_Owner_class =<TDES_BRANCH.TDES_BRANCH object at 0x00000214A09B25B0>  
(UM_Model_02)
```

```
UM_Model_02.MACHINE1.DESObject_Name_str =MACHINE1
```

```
UM_Model_02.MACHINE1.DESObject_ID_Number =16
```

```
UM_Model_02.MACHINE1.DESObject_Type =TMACHINE
```

```
UM_Model_02.MACHINE1.DESObject_Priority_To_DESEntity_From_DESObject =0
UM_Model_02.MACHINE1.DESBranch_Name_str =UM_Model_02

UM_Model_02.MACHINE1.DESObject_Commanded_State_In_Previous_Step =TCommanded_Enabled_State
UM_Model_02.MACHINE1.DESObject_Commanded_State =TCommanded_Enabled_State

UM_Model_02.MACHINE1.DESObject_Work_State =TBusy
UM_Model_02.MACHINE1.DESObject_Work_State_In_Previous_Step =TBusy
UM_Model_02.MACHINE1.DESObject_Work_State_Before_Fail_Or_Pause =TBusy

UM_Model_02.MACHINE1.Time_Percent_In_Statuses[ TIdle] = 0.000
UM_Model_02.MACHINE1.Time_Percent_In_Statuses[ TBusy] =100.000
UM_Model_02.MACHINE1.Time_Percent_In_Statuses[TBlocked] = 0.000
UM_Model_02.MACHINE1.Time_Percent_In_Statuses[ TFailed] = 0.000
UM_Model_02.MACHINE1.Time_Percent_In_Statuses[ TPaused] = 0.000

UM_Model_02.MACHINE1.System_Attributes[ i] = Name
Value
UM_Model_02.MACHINE1.System_Attributes[ 0] = WORKED_Entity_Sample_Number
120
UM_Model_02.MACHINE1.System_Attributes[ 1] = WORKED_Entity_Sample_Summa
1200.0
UM_Model_02.MACHINE1.System_Attributes[ 2] = WORKED_Entity_Average_Staying_Time_in_DESObject
0:00:00:00.000
UM_Model_02.MACHINE1.System_Attributes[ 3] = WORKED_Entity_Through_Output_Rate at Output_Channel[0]
0.0991667 [entity/seconds]
UM_Model_02.MACHINE1.System_Attributes[ 4] = WORKED_Entity_Produce_Time at Output_Channel[0]
10.0840336 [seconds/entity]

UM_Model_02.MACHINE1.First_Calculation? =False

UM_Model_02.MACHINE1.InputChannel_Index_Selection_Strategy =TSelection_Random_Selected_Index
UM_Model_02.MACHINE1.InputChannel_Index =0

UM_Model_02.MACHINE1.Number_Of_InputChannels =6

UM_Model_02.MACHINE1.Input [ 0].Data =#Alma_(#158)
```

```
UM_Model_02.MACHINE1.Input [ 0].Channel_Is_Enabled =True
UM_Model_02.MACHINE1.Input [ 0].Channel_Is_Connected =True    (#_of_Entities= 122)

UM_Model_02.MACHINE1.Input [ 1].Data =#Empty
UM_Model_02.MACHINE1.Input [ 1].Channel_Is_Enabled =True
UM_Model_02.MACHINE1.Input [ 1].Channel_Is_Connected =False    (#_of_Entities= 0)

UM_Model_02.MACHINE1.Input [ 2].Data =#Empty
UM_Model_02.MACHINE1.Input [ 2].Channel_Is_Enabled =True
UM_Model_02.MACHINE1.Input [ 2].Channel_Is_Connected =False    (#_of_Entities= 0)

UM_Model_02.MACHINE1.Input [ 3].Data =#Empty
UM_Model_02.MACHINE1.Input [ 3].Channel_Is_Enabled =True
UM_Model_02.MACHINE1.Input [ 3].Channel_Is_Connected =False    (#_of_Entities= 0)

UM_Model_02.MACHINE1.Input [ 4].Data =#Empty
UM_Model_02.MACHINE1.Input [ 4].Channel_Is_Enabled =True
UM_Model_02.MACHINE1.Input [ 4].Channel_Is_Connected =False    (#_of_Entities= 0)

UM_Model_02.MACHINE1.Input [ 5].Data =#Empty
UM_Model_02.MACHINE1.Input [ 5].Channel_Is_Enabled =True
UM_Model_02.MACHINE1.Input [ 5].Channel_Is_Connected =False    (#_of_Entities= 0)

UM_Model_02.MACHINE1.Capacity =1
UM_Model_02.MACHINE1.Number_Of_Content_Entities =1
UM_Model_02.MACHINE1.Content_Entities_Vector[ 0] =#157

UM_Model_02.MACHINE1.OutputChannel_Index_Selection_Strategy =TSelection_Random_Selected_Index
UM_Model_02.MACHINE1.OutputChannel_Index =0

UM_Model_02.MACHINE1.Number_Of_OutputChannels =6

UM_Model_02.MACHINE1.Output [ 0].Data =#Empty
UM_Model_02.MACHINE1.Output [ 0].Channel_Is_Enabled =True
UM_Model_02.MACHINE1.Output [ 0].Channel_Is_Connected =True    (#_of_Entities= 120)

UM_Model_02.MACHINE1.Output [ 1].Data =#Empty
UM_Model_02.MACHINE1.Output [ 1].Channel_Is_Enabled =True
UM_Model_02.MACHINE1.Output [ 1].Channel_Is_Connected =False    (#_of_Entities= 0)
```

```
UM_Model_02.MACHINE1.Output [ 2].Data =#Empty
UM_Model_02.MACHINE1.Output [ 2].Channel_Is_Enabled =True
UM_Model_02.MACHINE1.Output [ 2].Channel_Is_Connected =False    (#_of_Entities= 0)
```

```
UM_Model_02.MACHINE1.Output [ 3].Data =#Empty
UM_Model_02.MACHINE1.Output [ 3].Channel_Is_Enabled =True
UM_Model_02.MACHINE1.Output [ 3].Channel_Is_Connected =False    (#_of_Entities= 0)
```

```
UM_Model_02.MACHINE1.Output [ 4].Data =#Empty
UM_Model_02.MACHINE1.Output [ 4].Channel_Is_Enabled =True
UM_Model_02.MACHINE1.Output [ 4].Channel_Is_Connected =False    (#_of_Entities= 0)
```

```
UM_Model_02.MACHINE1.Output [ 5].Data =#Empty
UM_Model_02.MACHINE1.Output [ 5].Channel_Is_Enabled =True
UM_Model_02.MACHINE1.Output [ 5].Channel_Is_Connected =False    (#_of_Entities= 0)
```

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UM_Model_02.DESBranch_DESObjectList[    5]
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```
UM_Model_02.SINK1.SINK_Last_Content_Entity_ID_Number =#0
UM_Model_02.SINK1.SINK_NumberOfSinkedObjects =120
```

```
UM_Model_02.SINK1.SINK_Last_Calculation_Time = 0:00:20:00.000
```

```
.....
```

UM_Model_02.SINK1.DESObject_Owner_class =<TDES_BRANCH.TDES_BRANCH object at 0x00000214A09B25B0> (UM_Model_02)

UM_Model_02.SINK1.DESObject_Name_str =SINK1

UM_Model_02.SINK1.DESObject_ID_Number =17

UM_Model_02.SINK1.DESObject_Type =TSINK

UM_Model_02.SINK1.DESObject_Priority_To_DESEntity_From_DESObject =0

UM_Model_02.SINK1.DESBranch_Name_str =UM_Model_02

UM_Model_02.SINK1.DESObject_Commanded_State_In_Previous_Step =TCommanded_Enabled_State

UM_Model_02.SINK1.DESObject_Commanded_State =TCommanded_Enabled_State

UM_Model_02.SINK1.DESObject_Work_State =TIdle

UM_Model_02.SINK1.DESObject_Work_State_In_Previous_Step =TIdle

UM_Model_02.SINK1.DESObject_Work_State_Before_Fail_Or_Pause =TIdle

UM_Model_02.SINK1.Time_Percent_In_Statuses[TIdle] =100.000

UM_Model_02.SINK1.Time_Percent_In_Statuses[TBusy] = 0.000

UM_Model_02.SINK1.Time_Percent_In_Statuses[TBlocked] = 0.000

UM_Model_02.SINK1.Time_Percent_In_Statuses[TFailed] = 0.000

UM_Model_02.SINK1.Time_Percent_In_Statuses[TPaused] = 0.000

UM_Model_02.SINK1.System_Attributes[i] = Name	Value
UM_Model_02.SINK1.System_Attributes[0] = WORKED_Entity_Sample_Number	120
UM_Model_02.SINK1.System_Attributes[1] = WORKED_Entity_Sample_Summa	0.0
UM_Model_02.SINK1.System_Attributes[2] = WORKED_Entity_Average_Staying_Time_in_DESObject	
0:00:00:00.000	

UM_Model_02.SINK1.First_Calculation? =False

UM_Model_02.SINK1.InputChannel_Index_Selection_Strategy =TSelection_Random_Selected_Index

UM_Model_02.SINK1.InputChannel_Index =0

UM_Model_02.SINK1.Number_Of_InputChannels =6

UM_Model_02.SINK1.Input [0].Data =#Empty

UM_Model_02.SINK1.Input [0].Channel_Is_Enabled =True

UM_Model_02.SINK1.Input [0].Channel_Is_Connected =True (#_of_Entities= 120)

```
UM_Model_02.SINK1.Input [ 1].Data =#Empty
UM_Model_02.SINK1.Input [ 1].Channel_Is_Enabled =True
UM_Model_02.SINK1.Input [ 1].Channel_Is_Connected =False    (#_of_Entities= 0)
```

```
UM_Model_02.SINK1.Input [ 2].Data =#Empty
UM_Model_02.SINK1.Input [ 2].Channel_Is_Enabled =True
UM_Model_02.SINK1.Input [ 2].Channel_Is_Connected =False    (#_of_Entities= 0)
```

```
UM_Model_02.SINK1.Input [ 3].Data =#Empty
UM_Model_02.SINK1.Input [ 3].Channel_Is_Enabled =True
UM_Model_02.SINK1.Input [ 3].Channel_Is_Connected =False    (#_of_Entities= 0)
```

```
UM_Model_02.SINK1.Input [ 4].Data =#Empty
UM_Model_02.SINK1.Input [ 4].Channel_Is_Enabled =True
UM_Model_02.SINK1.Input [ 4].Channel_Is_Connected =False    (#_of_Entities= 0)
```

```
UM_Model_02.SINK1.Input [ 5].Data =#Empty
UM_Model_02.SINK1.Input [ 5].Channel_Is_Enabled =True
UM_Model_02.SINK1.Input [ 5].Channel_Is_Connected =False    (#_of_Entities= 0)
```

```
UM_Model_02.SINK1.Capacity =1
UM_Model_02.SINK1.Number_Of_Content_Entities =0
```

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UM_Model_02.DESBranch_DESObjectList[      6]
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UM_Model_02.SOURCE1.SOURCE_Created_Entity.Name_str =Alma

UM_Model_02.SOURCE1.SOURCE_Time_Of_Next_Launching = 0:00:20:16.000
UM_Model_02.SOURCE1.SOURCE_Time_Step = 0:00:00:08.000

UM_Model_02.SOURCE1.SOURCE_Distribution =TDistribution_Constant_Value

UM_Model_02.SOURCE1.SOURCE_Constant_Value_Of_Time = 0:00:00:08.000
UM_Model_02.SOURCE1.SOURCE_Mean_Of_Time = 0:00:00:08.000
UM_Model_02.SOURCE1.SOURCE_Deviation_Of_Time = 0:00:00:01.000
UM_Model_02.SOURCE1.SOURCE_Maximum_Of_Time = 0:00:00:03.000
UM_Model_02.SOURCE1.SOURCE_Usual_Of_Time = 0:00:00:02.000
UM_Model_02.SOURCE1.SOURCE_Minimum_Of_Time = 0:00:00:01.000

UM_Model_02.SOURCE1.SOURCE_Maximum_Batch_Size =20000000000
UM_Model_02.SOURCE1.SOURCE_Number_Of_Created_Objects =151

UM_Model_02.SOURCE1.SOURCE_Last_Calculation_Time = 0:00:20:08.000
.....

UM_Model_02.SOURCE1.DESObject_Owner_class =<TDES_BRANCH.TDES_BRANCH object at 0x00000214A09B25B0> (UM_Model_02)

UM_Model_02.SOURCE1.DESObject_Name_str =SOURCE1
UM_Model_02.SOURCE1.DESObject_ID_Number =18
UM_Model_02.SOURCE1.DESObject_Type =TSOURCE

UM_Model_02.SOURCE1.DESObject_Priority_To_DESEntity_From_DESObject =0
UM_Model_02.SOURCE1.DESBranch_Name_str =UM_Model_02

UM_Model_02.SOURCE1.DESObject_Commanded_State_In_Previous_Step =TCommanded_Enabled_State
UM_Model_02.SOURCE1.DESObject_Commanded_State =TCommanded_Enabled_State

UM_Model_02.SOURCE1.DESObject_Work_State =TIdle
UM_Model_02.SOURCE1.DESObject_Work_State_In_Previous_Step =TIdle
UM_Model_02.SOURCE1.DESObject_Work_State_Before_Fail_Or_Pause =TIdle

UM_Model_02.SOURCE1.Time_Percent_In_Statuses[ TIdle] =100.000
UM_Model_02.SOURCE1.Time_Percent_In_Statuses[ TBusy] = 0.000

```

```

UM_Model_02.SOURCE1.Time_Percent_In_Statuses[TBlocked] = 0.000
UM_Model_02.SOURCE1.Time_Percent_In_Statuses[ TFailed] = 0.000
UM_Model_02.SOURCE1.Time_Percent_In_Statuses[ TPaused] = 0.000

UM_Model_02.SOURCE1.System_Attributes[ i] = Name
Value
UM_Model_02.SOURCE1.System_Attributes[ 0] = WORKED_Entity_Sample_Number 152
UM_Model_02.SOURCE1.System_Attributes[ 1] = WORKED_Entity_Sample_Summa 0.0
UM_Model_02.SOURCE1.System_Attributes[ 2] = WORKED_Entity_Average_Staying_Time_in_DESObject
0:00:00:00.000
UM_Model_02.SOURCE1.System_Attributes[ 3] = WORKED_Entity_Through_Output_Rate at Output_Channel[0]
0.1250000 [entity/seconds]
UM_Model_02.SOURCE1.System_Attributes[ 4] = WORKED_Entity_Produce_Time at Output_Channel[0]
8.0000000 [seconds/entity]

UM_Model_02.SOURCE1.First_Calculation? =False

UM_Model_02.SOURCE1.Capacity =1
UM_Model_02.SOURCE1.Number_Of_Content_Entities =0

UM_Model_02.SOURCE1.OutputChannel_Index_Selection_Strategy =TSelection_Random_Selected_Index
UM_Model_02.SOURCE1.OutputChannel_Index =0

UM_Model_02.SOURCE1.Number_Of_OutputChannels =6

UM_Model_02.SOURCE1.Output [ 0].Data =#Alma_(#188)
UM_Model_02.SOURCE1.Output [ 0].Channel_Is_Enabled =True
UM_Model_02.SOURCE1.Output [ 0].Channel_Is_Connected =True (#_of_Entities= 151)

UM_Model_02.SOURCE1.Output [ 1].Data =#Empty
UM_Model_02.SOURCE1.Output [ 1].Channel_Is_Enabled =True
UM_Model_02.SOURCE1.Output [ 1].Channel_Is_Connected =False (#_of_Entities= 0)

UM_Model_02.SOURCE1.Output [ 2].Data =#Empty
UM_Model_02.SOURCE1.Output [ 2].Channel_Is_Enabled =True
UM_Model_02.SOURCE1.Output [ 2].Channel_Is_Connected =False (#_of_Entities= 0)

UM_Model_02.SOURCE1.Output [ 3].Data =#Empty

```

```
UM_Model_02.SOURCE1.Output [ 3].Channel_Is_Enabled =True
UM_Model_02.SOURCE1.Output [ 3].Channel_Is_Connected =False    (#_of_Entities= 0)
```

```
UM_Model_02.SOURCE1.Output [ 4].Data =#Empty
UM_Model_02.SOURCE1.Output [ 4].Channel_Is_Enabled =True
UM_Model_02.SOURCE1.Output [ 4].Channel_Is_Connected =False    (#_of_Entities= 0)
```

```
UM_Model_02.SOURCE1.Output [ 5].Data =#Empty
UM_Model_02.SOURCE1.Output [ 5].Channel_Is_Enabled =True
UM_Model_02.SOURCE1.Output [ 5].Channel_Is_Connected =False    (#_of_Entities= 0)
```

```
*****
TSOURCE_end_TSOURCE_end_TSOURCE_end_TSOURCE_end_TSOURCE_end_TSOURCE_end_TSOURCE_
-----
```

```
#####
#####
UM_Model_02.DESBranch_DESObjectList[      7]
```

```
*****
TUNLOCK_start_TUNLOCK_start_TUNLOCK_start_TUNLOCK_start_TUNLOCK_start_TUNLOCK_st
+++++
```

```
UM_Model_02.UNLOCK.UNLOCK_Time_Of_Next_Launching =  0:00:20:00.000
UM_Model_02.UNLOCK.UNLOCK_Time_Step =  0:00:00:00.000
```

```
UM_Model_02.UNLOCK.UNLOCK_Last_Calculation_Time =  0:00:20:00.000
.....
```

```
UM_Model_02.UNLOCK.DESObject_Owner_class =<TDES_BRANCH.TDES_BRANCH object at 0x00000214A09B25B0>    (UM_Model_02)
```

```
UM_Model_02.UNLOCK.DESObject_Name_str =UNLOCK
UM_Model_02.UNLOCK.DESObject_ID_Number =20
UM_Model_02.UNLOCK.DESObject_Type =TUNLOCK
```

```

UM_Model_02.UNLOCK.DESObject_Priority_To_DESEntity_From_DESObject =0
UM_Model_02.UNLOCK.DESBranch_Name_str =UM_Model_02

UM_Model_02.UNLOCK.DESObject_Commanded_State_In_Previous_Step =TCommanded_Enabled_State
UM_Model_02.UNLOCK.DESObject_Commanded_State =TCommanded_Enabled_State

UM_Model_02.UNLOCK.DESObject_Work_State =TIdle
UM_Model_02.UNLOCK.DESObject_Work_State_In_Previous_Step =TIdle
UM_Model_02.UNLOCK.DESObject_Work_State_Before_Fail_Or_Pause =TIdle

UM_Model_02.UNLOCK.Time_Percent_In_Statuses[ TIdle] = 1.490
UM_Model_02.UNLOCK.Time_Percent_In_Statuses[ TBusy] = 98.510
UM_Model_02.UNLOCK.Time_Percent_In_Statuses[TBlocked] = 0.000
UM_Model_02.UNLOCK.Time_Percent_In_Statuses[ TFailed] = 0.000
UM_Model_02.UNLOCK.Time_Percent_In_Statuses[ TPaused] = 0.000

UM_Model_02.UNLOCK.System_Attributes[ i] = Name
Value
UM_Model_02.UNLOCK.System_Attributes[ 0] = WORKED_Entity_Sample_Number 120
UM_Model_02.UNLOCK.System_Attributes[ 1] = WORKED_Entity_Sample_Summa 0.0
UM_Model_02.UNLOCK.System_Attributes[ 2] = WORKED_Entity_Average_Staying_Time_in_DESObject
0:00:00:00.000
UM_Model_02.UNLOCK.System_Attributes[ 3] = WORKED_Entity_Through_Output_Rate at Output_Channel[0]
0.0991667 [entity/seconds]
UM_Model_02.UNLOCK.System_Attributes[ 4] = WORKED_Entity_Produce_Time at Output_Channel[0]
10.0840336 [seconds/entity]

UM_Model_02.UNLOCK.First_Calculation? =False

UM_Model_02.UNLOCK.InputChannel_Index_Selection_Strategy =TSelection_Constant_Index
UM_Model_02.UNLOCK.InputChannel_Index =0

UM_Model_02.UNLOCK.Number_Of_InputChannels =2

UM_Model_02.UNLOCK.Input [ 0].Data =#Empty
UM_Model_02.UNLOCK.Input [ 0].Channel_Is_Enabled =True
UM_Model_02.UNLOCK.Input [ 0].Channel_Is_Connected =True (#_of_Entities= 120)

```

```
UM_Model_02.UNLOCK.Input [ 1].Data =#Empty
UM_Model_02.UNLOCK.Input [ 1].Channel_Is_Enabled =True
UM_Model_02.UNLOCK.Input [ 1].Channel_Is_Connected =True    (#_of_Entities= 0)

UM_Model_02.UNLOCK.Capacity =1
UM_Model_02.UNLOCK.Number_Of_Content_Entities =0

UM_Model_02.UNLOCK.OutputChannel_Index_Selection_Strategy =TSelection_Constant_Index
UM_Model_02.UNLOCK.OutputChannel_Index =0

UM_Model_02.UNLOCK.Number_Of_OutputChannels =1

UM_Model_02.UNLOCK.Output [ 0].Data =#Empty
UM_Model_02.UNLOCK.Output [ 0].Channel_Is_Enabled =True
UM_Model_02.UNLOCK.Output [ 0].Channel_Is_Connected =True    (#_of_Entities= 120)

*****

End of "UM_Model_02.Print_DESObjectList"
```

5.2.3 DES_Modell_02 TDES_ENTITY list

Local time :Fri Oct 23 08:24:27 2020

Model_Name : UM_Model_02

UM_Model_02.Print_DESEntityList_Short: (ENTITYLIST Result)

Number of Entities = 32

GTime_Now [DDD:HH:MM:SS.XXX] = 0:00:20:08.000

```
=====
UM_Model_02.ENTITYLIST[      i] = Entity_Name  Entity_Position
Entity_Content
=====
```

```
=====
UM_Model_02.ENTITYLIST[      0] = Alma_(#157)  (MACHINE1__{TIn_Object})
UM_Model_02.ENTITYLIST[      1] = Alma_(#158)  (MACHINE1__{TAt_Input_Channel[0]})
UM_Model_02.ENTITYLIST[      2] = Alma_(#159)  (BUFFER2_Before_Machine__{TAt_Output_Channel[0]})
UM_Model_02.ENTITYLIST[      3] = Alma_(#160)  (BUFFER2_Before_Machine__{TIn_Object})
UM_Model_02.ENTITYLIST[      4] = Alma_(#161)  (BUFFER2_Before_Machine__{TIn_Object})
UM_Model_02.ENTITYLIST[      5] = Alma_(#162)  (BUFFER2_Before_Machine__{TIn_Object})
UM_Model_02.ENTITYLIST[      6] = Alma_(#163)  (BUFFER2_Before_Machine__{TIn_Object})
UM_Model_02.ENTITYLIST[      7] = Alma_(#164)  (BUFFER2_Before_Machine__{TIn_Object})
UM_Model_02.ENTITYLIST[      8] = Alma_(#165)  (BUFFER2_Before_Machine__{TIn_Object})
UM_Model_02.ENTITYLIST[      9] = Alma_(#166)  (BUFFER2_Before_Machine__{TIn_Object})
UM_Model_02.ENTITYLIST[     10] = Alma_(#167)  (BUFFER2_Before_Machine__{TIn_Object})
UM_Model_02.ENTITYLIST[     11] = Alma_(#168)  (BUFFER2_Before_Machine__{TIn_Object})
UM_Model_02.ENTITYLIST[     12] = Alma_(#169)  (BUFFER2_Before_Machine__{TIn_Object})
UM_Model_02.ENTITYLIST[     13] = Alma_(#170)  (BUFFER2_Before_Machine__{TIn_Object})
UM_Model_02.ENTITYLIST[     14] = Alma_(#171)  (BUFFER2_Before_Machine__{TIn_Object})
UM_Model_02.ENTITYLIST[     15] = Alma_(#172)  (BUFFER2_Before_Machine__{TIn_Object})
UM_Model_02.ENTITYLIST[     16] = Alma_(#173)  (BUFFER2_Before_Machine__{TIn_Object})
=====
```

```

UM_Model_02.ENTITYLIST[ 17] = Alma_(#174) (BUFFER2_Before_Machine__{TIn_Object})
UM_Model_02.ENTITYLIST[ 18] = Alma_(#175) (BUFFER2_Before_Machine__{TIn_Object})
UM_Model_02.ENTITYLIST[ 19] = Alma_(#176) (BUFFER2_Before_Machine__{TIn_Object})
UM_Model_02.ENTITYLIST[ 20] = Alma_(#177) (BUFFER2_Before_Machine__{TIn_Object})
UM_Model_02.ENTITYLIST[ 21] = Alma_(#178) (BUFFER2_Before_Machine__{TIn_Object})
UM_Model_02.ENTITYLIST[ 22] = Alma_(#179) (LOCK__{TAt_Output_Channel[0]})
UM_Model_02.ENTITYLIST[ 23] = Alma_(#180) (LOCK__{TIn_Object})
UM_Model_02.ENTITYLIST[ 24] = Alma_(#181) (LOCK__{TAt_Input_Channel[0]})
UM_Model_02.ENTITYLIST[ 25] = Alma_(#182) (BUFFER1_After_Route__{TAt_Output_Channel[0]})
UM_Model_02.ENTITYLIST[ 26] = Alma_(#183) (BUFFER1_After_Route__{TIn_Object})
UM_Model_02.ENTITYLIST[ 27] = Alma_(#184) (BUFFER1_After_Route__{TIn_Object})
UM_Model_02.ENTITYLIST[ 28] = Alma_(#185) (BUFFER1_After_Route__{TIn_Object})
UM_Model_02.ENTITYLIST[ 29] = Alma_(#186) (BUFFER1_After_Route__{TIn_Object})
UM_Model_02.ENTITYLIST[ 30] = Alma_(#187) (BUFFER1_After_Route__{TIn_Object})
UM_Model_02.ENTITYLIST[ 31] = Alma_(#188) (SOURCE1__{TAt_Output_Channel[0]})

```

```
UM_Model_02.Print_ENTITYLIST: (ENTITYLIST Result)
```

```
=====
```

```
Number of Entities = 32
```

```
GTime_Now [DDD:HH:MM:SS.XXX] = 0:00:20:08.000
```

```

#####
#####
ENTITYLIST[ 0]

```

```

ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_
+++++

```

```

UM_Model_02.Alma_(#157).DESEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at 0x00000214A09AF880>
(ENTITYLIST)

```

```

UM_Model_02.Alma_(#157).Name_Of_Entity_str =Alma_(#157)
UM_Model_02.Alma_(#157).Borning_Time = 0:00:16:00.000
UM_Model_02.Alma_(#157).Terminate_Time = Entity is staying in "MACHINE1__{TIn_Object}"

```

```

UM_Model_02.Alma_(#157).InputChannel_Index_Of_Arrive =0
UM_Model_02.Alma_(#157).OutputChannel_Index_Of_Leave =0

```

```

UM_Model_02.Alma_(#157).System_Attribute[ 0] =          WORKED_Entity_Arrive_Time
1200.000  1200.000
UM_Model_02.Alma_(#157).System_Attribute[ 1] =          WORKED_Entity_Terminate_Time
-1 Entity is staying in "__{TIn_Object}"
UM_Model_02.Alma_(#157).System_Attribute[ 2] =          DESEntity_Time_Of_Next_Launching
1210.0 in "MACHINE1"

UM_Model_02.Alma_(#157).Number_Of_Content_Entities =0
-----
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_

#####
#####
ENTITYLIST[      1]

ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_
+++++
UM_Model_02.Alma_(#158).DESEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at 0x00000214A09AF880>
(ENTITYLIST)

UM_Model_02.Alma_(#158).Name_Of_Entity_str =Alma_(#158)
UM_Model_02.Alma_(#158).Borning_Time      = 0:00:16:08.000
UM_Model_02.Alma_(#158).Terminate_Time = Entity is staying in "MACHINE1__{TAt_Input_Channel[0]}"

UM_Model_02.Alma_(#158).InputChannel_Index_Of_Arrive =0
UM_Model_02.Alma_(#158).OutputChannel_Index_Of_Leave =0

UM_Model_02.Alma_(#158).System_Attribute[ 0] =          WORKED_Entity_Arrive_Time
1010.000  1010.000
UM_Model_02.Alma_(#158).System_Attribute[ 1] =          WORKED_Entity_Terminate_Time
1190.000

UM_Model_02.Alma_(#158).Number_Of_Content_Entities =0
-----
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_

```



```
#####
#####
ENTITYLIST[      2]

ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_
+++++++
UM_Model_02.Alma_(#159).DESEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at 0x00000214A09AF880>
(ENTITYLIST)

UM_Model_02.Alma_(#159).Name_Of_Entity_str =Alma_(#159)
UM_Model_02.Alma_(#159).Borning_Time      =  0:00:16:16.000
UM_Model_02.Alma_(#159).Terminate_Time = Entity is staying in "BUFFER2_Before_Machine__{TAt_Output_Channel[0]}"

UM_Model_02.Alma_(#159).InputChannel_Index_Of_Arrive =0
UM_Model_02.Alma_(#159).OutputChannel_Index_Of_Leave =0

UM_Model_02.Alma_(#159).System_Attribute[  0] =                WORKED_Entity_Arrive_Time
1010.000    1010.000
UM_Model_02.Alma_(#159).System_Attribute[  1] =                WORKED_Entity_Terminate_Time
1200.000

UM_Model_02.Alma_(#159).Number_Of_Content_Entities =0
-----
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_

#####
#####
ENTITYLIST[      3]

ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_
+++++++
UM_Model_02.Alma_(#160).DESEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at 0x00000214A09AF880>
(ENTITYLIST)
```

```

UM_Model_02.Alma_(#160).Name_Of_Entity_str =Alma_(#160)
UM_Model_02.Alma_(#160).Borning_Time      = 0:00:16:24.000
UM_Model_02.Alma_(#160).Terminate_Time = Entity is staying in "BUFFER2_Before_Machine__{TIn_Object}"

UM_Model_02.Alma_(#160).InputChannel_Index_Of_Arrive =0
UM_Model_02.Alma_(#160).OutputChannel_Index_Of_Leave =0

UM_Model_02.Alma_(#160).System_Attribute[ 0] =                WORKED_Entity_Arrive_Time
1010.000    1010.000
UM_Model_02.Alma_(#160).System_Attribute[ 1] =                WORKED_Entity_Terminate_Time
-1    Entity is staying in "__{TIn_Object}"

UM_Model_02.Alma_(#160).Number_Of_Content_Entities =0
-----
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_

#####
#####
ENTITYLIST[      4]

ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_
+++++++
UM_Model_02.Alma_(#161).DESEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at 0x00000214A09AF880>
(ENTITYLIST)

UM_Model_02.Alma_(#161).Name_Of_Entity_str =Alma_(#161)
UM_Model_02.Alma_(#161).Borning_Time      = 0:00:16:32.000
UM_Model_02.Alma_(#161).Terminate_Time = Entity is staying in "BUFFER2_Before_Machine__{TIn_Object}"

UM_Model_02.Alma_(#161).InputChannel_Index_Of_Arrive =0
UM_Model_02.Alma_(#161).OutputChannel_Index_Of_Leave =0

UM_Model_02.Alma_(#161).System_Attribute[ 0] =                WORKED_Entity_Arrive_Time
1040.000    1040.000

```

```

UM_Model_02.Alma_(#161).System_Attribute[ 1] =          WORKED_Entity_Terminate_Time
-1 Entity is staying in "__{TIn_Object}"

UM_Model_02.Alma_(#161).Number_Of_Content_Entities =0
-----
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_

#####
#####
ENTITYLIST[      5]

ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_
+++++++
UM_Model_02.Alma_(#162).DESEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at 0x00000214A09AF880>
(ENTITYLIST)

UM_Model_02.Alma_(#162).Name_Of_Entity_str =Alma_(#162)
UM_Model_02.Alma_(#162).Borning_Time      =  0:00:16:40.000
UM_Model_02.Alma_(#162).Terminate_Time = Entity is staying in "BUFFER2_Before_Machine__{TIn_Object}"

UM_Model_02.Alma_(#162).InputChannel_Index_Of_Arrive =0
UM_Model_02.Alma_(#162).OutputChannel_Index_Of_Leave =0

UM_Model_02.Alma_(#162).System_Attribute[ 0] =          WORKED_Entity_Arrive_Time
1040.000  1040.000
UM_Model_02.Alma_(#162).System_Attribute[ 1] =          WORKED_Entity_Terminate_Time
-1 Entity is staying in "__{TIn_Object}"

UM_Model_02.Alma_(#162).Number_Of_Content_Entities =0
-----
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_

```

```
#####
#####
ENTITYLIST[      6]

ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_
+++++++
UM_Model_02.Alma_(#163).DESEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at 0x00000214A09AF880>
(ENTITYLIST)

UM_Model_02.Alma_(#163).Name_Of_Entity_str =Alma_(#163)
UM_Model_02.Alma_(#163).Borning_Time      = 0:00:16:48.000
UM_Model_02.Alma_(#163).Terminate_Time = Entity is staying in "BUFFER2_Before_Machine__ {TIn_Object}"

UM_Model_02.Alma_(#163).InputChannel_Index_Of_Arrive =0
UM_Model_02.Alma_(#163).OutputChannel_Index_Of_Leave =0

UM_Model_02.Alma_(#163).System_Attribute[  0] =                WORKED_Entity_Arrive_Time
1040.000    1040.000
UM_Model_02.Alma_(#163).System_Attribute[  1] =                WORKED_Entity_Terminate_Time
-1    Entity is staying in "__ {TIn_Object}"

UM_Model_02.Alma_(#163).Number_Of_Content_Entities =0
-----
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_

#####
#####
ENTITYLIST[      7]

ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_
+++++++
UM_Model_02.Alma_(#164).DESEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at 0x00000214A09AF880>
(ENTITYLIST)

UM_Model_02.Alma_(#164).Name_Of_Entity_str =Alma_(#164)
UM_Model_02.Alma_(#164).Borning_Time      = 0:00:16:56.000
```

```

UM_Model_02.Alma_(#164).Terminate_Time = Entity is staying in "BUFFER2_Before_Machine__{TIn_Object}"

UM_Model_02.Alma_(#164).InputChannel_Index_Of_Arrive =0
UM_Model_02.Alma_(#164).OutputChannel_Index_Of_Leave =0

UM_Model_02.Alma_(#164).System_Attribute[ 0] = WORKED_Entity_Arrive_Time
1070.000 1070.000
UM_Model_02.Alma_(#164).System_Attribute[ 1] = WORKED_Entity_Terminate_Time
-1 Entity is staying in "__{TIn_Object}"

UM_Model_02.Alma_(#164).Number_Of_Content_Entities =0
-----
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_

#####
#####
ENTITYLIST[ 8]

ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_
+++++
UM_Model_02.Alma_(#165).DESEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at 0x00000214A09AF880>
(ENTITYLIST)

UM_Model_02.Alma_(#165).Name_Of_Entity_str =Alma_(#165)
UM_Model_02.Alma_(#165).Borning_Time = 0:00:17:04.000
UM_Model_02.Alma_(#165).Terminate_Time = Entity is staying in "BUFFER2_Before_Machine__{TIn_Object}"

UM_Model_02.Alma_(#165).InputChannel_Index_Of_Arrive =0
UM_Model_02.Alma_(#165).OutputChannel_Index_Of_Leave =0

UM_Model_02.Alma_(#165).System_Attribute[ 0] = WORKED_Entity_Arrive_Time
1070.000 1070.000
UM_Model_02.Alma_(#165).System_Attribute[ 1] = WORKED_Entity_Terminate_Time
-1 Entity is staying in "__{TIn_Object}"

UM_Model_02.Alma_(#165).Number_Of_Content_Entities =0

```

```
-----
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_
```

```
#####
#####
ENTITYLIST[      9]
```

```
ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_
+++++
UM_Model_02.Alma_(#166).DESEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at 0x00000214A09AF880>
(ENTITYLIST)
```

```
UM_Model_02.Alma_(#166).Name_Of_Entity_str =Alma_(#166)
UM_Model_02.Alma_(#166).Borning_Time      =  0:00:17:12.000
UM_Model_02.Alma_(#166).Terminate_Time   = Entity is staying in "BUFFER2_Before_Machine__{TIn_Object}"
```

```
UM_Model_02.Alma_(#166).InputChannel_Index_Of_Arrive =0
UM_Model_02.Alma_(#166).OutputChannel_Index_Of_Leave =0
```

```
UM_Model_02.Alma_(#166).System_Attribute[  0] =                WORKED_Entity_Arrive_Time
1070.000    1070.000
UM_Model_02.Alma_(#166).System_Attribute[  1] =                WORKED_Entity_Terminate_Time
-1    Entity is staying in "__{TIn_Object}"
```

```
UM_Model_02.Alma_(#166).Number_Of_Content_Entities =0
```

```
-----
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_
```

```
#####
#####
ENTITYLIST[     10]
```

```
ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_
```

```

+++++
UM_Model_02.Alma_(#167).DESEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at 0x00000214A09AF880>
(ENTITYLIST)

UM_Model_02.Alma_(#167).Name_Of_Entity_str =Alma_(#167)
UM_Model_02.Alma_(#167).Borning_Time      = 0:00:17:20.000
UM_Model_02.Alma_(#167).Terminate_Time = Entity is staying in "BUFFER2_Before_Machine__{TIn_Object}"

UM_Model_02.Alma_(#167).InputChannel_Index_Of_Arrive =0
UM_Model_02.Alma_(#167).OutputChannel_Index_Of_Leave =0

UM_Model_02.Alma_(#167).System_Attribute[ 0] =                WORKED_Entity_Arrive_Time
1100.000    1100.000
UM_Model_02.Alma_(#167).System_Attribute[ 1] =                WORKED_Entity_Terminate_Time
-1    Entity is staying in "__{TIn_Object}"

UM_Model_02.Alma_(#167).Number_Of_Content_Entities =0
-----
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_

#####
#####
ENTITYLIST[    11]

ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_
+++++
UM_Model_02.Alma_(#168).DESEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at 0x00000214A09AF880>
(ENTITYLIST)

UM_Model_02.Alma_(#168).Name_Of_Entity_str =Alma_(#168)
UM_Model_02.Alma_(#168).Borning_Time      = 0:00:17:28.000
UM_Model_02.Alma_(#168).Terminate_Time = Entity is staying in "BUFFER2_Before_Machine__{TIn_Object}"

UM_Model_02.Alma_(#168).InputChannel_Index_Of_Arrive =0
UM_Model_02.Alma_(#168).OutputChannel_Index_Of_Leave =0

```

```

UM_Model_02.Alma_(#168).System_Attribute[ 0] =          WORKED_Entity_Arrive_Time
1100.000  1100.000
UM_Model_02.Alma_(#168).System_Attribute[ 1] =          WORKED_Entity_Terminate_Time
-1 Entity is staying in "__{TIn_Object}"

UM_Model_02.Alma_(#168).Number_Of_Content_Entities =0
-----
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_

#####
#####
ENTITYLIST[      12]

ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_
+++++
UM_Model_02.Alma_(#169).DESEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at 0x00000214A09AF880>
(ENTITYLIST)

UM_Model_02.Alma_(#169).Name_Of_Entity_str =Alma_(#169)
UM_Model_02.Alma_(#169).Borning_Time      =  0:00:17:36.000
UM_Model_02.Alma_(#169).Terminate_Time = Entity is staying in "BUFFER2_Before_Machine__{TIn_Object}"

UM_Model_02.Alma_(#169).InputChannel_Index_Of_Arrive =0
UM_Model_02.Alma_(#169).OutputChannel_Index_Of_Leave =0

UM_Model_02.Alma_(#169).System_Attribute[ 0] =          WORKED_Entity_Arrive_Time
1100.000  1100.000
UM_Model_02.Alma_(#169).System_Attribute[ 1] =          WORKED_Entity_Terminate_Time
-1 Entity is staying in "__{TIn_Object}"

UM_Model_02.Alma_(#169).Number_Of_Content_Entities =0
-----
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_

```



```
#####
#####
ENTITYLIST[      13]

ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_
+++++++
UM_Model_02.Alma_(#170).DESEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at 0x00000214A09AF880>
(ENTITYLIST)

UM_Model_02.Alma_(#170).Name_Of_Entity_str =Alma_(#170)
UM_Model_02.Alma_(#170).Borning_Time      = 0:00:17:44.000
UM_Model_02.Alma_(#170).Terminate_Time = Entity is staying in "BUFFER2_Before_Machine__{TIn_Object}"

UM_Model_02.Alma_(#170).InputChannel_Index_Of_Arrive =0
UM_Model_02.Alma_(#170).OutputChannel_Index_Of_Leave =0

UM_Model_02.Alma_(#170).System_Attribute[   0] =                WORKED_Entity_Arrive_Time
1130.000    1130.000
UM_Model_02.Alma_(#170).System_Attribute[   1] =                WORKED_Entity_Terminate_Time
-1    Entity is staying in "__{TIn_Object}"

UM_Model_02.Alma_(#170).Number_Of_Content_Entities =0
-----
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_

#####
#####
ENTITYLIST[      14]

ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_
+++++++
UM_Model_02.Alma_(#171).DESEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at 0x00000214A09AF880>
(ENTITYLIST)

UM_Model_02.Alma_(#171).Name_Of_Entity_str =Alma_(#171)
```

```

UM_Model_02.Alma_(#171).Borning_Time    = 0:00:17:52.000
UM_Model_02.Alma_(#171).Terminate_Time = Entity is staying in "BUFFER2_Before_Machine__{TIn_Object}"

UM_Model_02.Alma_(#171).InputChannel_Index_Of_Arrive =0
UM_Model_02.Alma_(#171).OutputChannel_Index_Of_Leave =0

UM_Model_02.Alma_(#171).System_Attribute[ 0] =          WORKED_Entity_Arrive_Time
1130.000    1130.000
UM_Model_02.Alma_(#171).System_Attribute[ 1] =          WORKED_Entity_Terminate_Time
-1    Entity is staying in "__{TIn_Object}"

UM_Model_02.Alma_(#171).Number_Of_Content_Entities =0
-----
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_

#####
#####
ENTITYLIST[    15]

ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_
+++++
UM_Model_02.Alma_(#172).DESEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at 0x00000214A09AF880>
(ENTITYLIST)

UM_Model_02.Alma_(#172).Name_Of_Entity_str =Alma_(#172)
UM_Model_02.Alma_(#172).Borning_Time    = 0:00:18:00.000
UM_Model_02.Alma_(#172).Terminate_Time = Entity is staying in "BUFFER2_Before_Machine__{TIn_Object}"

UM_Model_02.Alma_(#172).InputChannel_Index_Of_Arrive =0
UM_Model_02.Alma_(#172).OutputChannel_Index_Of_Leave =0

UM_Model_02.Alma_(#172).System_Attribute[ 0] =          WORKED_Entity_Arrive_Time
1130.000    1130.000
UM_Model_02.Alma_(#172).System_Attribute[ 1] =          WORKED_Entity_Terminate_Time
-1    Entity is staying in "__{TIn_Object}"

```

```
UM_Model_02.Alma_(#172).Number_Of_Content_Entities =0
```

```
-----  
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_
```

```
#####  
#####  
ENTITYLIST[    16]
```

```
ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_  
+++++
```

```
UM_Model_02.Alma_(#173).DESEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at 0x00000214A09AF880>  
(ENTITYLIST)
```

```
UM_Model_02.Alma_(#173).Name_Of_Entity_str =Alma_(#173)  
UM_Model_02.Alma_(#173).Borning_Time    =  0:00:18:08.000  
UM_Model_02.Alma_(#173).Terminate_Time = Entity is staying in "BUFFER2_Before_Machine__{TIn_Object}"
```

```
UM_Model_02.Alma_(#173).InputChannel_Index_Of_Arrive =0  
UM_Model_02.Alma_(#173).OutputChannel_Index_Of_Leave =0
```

```
UM_Model_02.Alma_(#173).System_Attribute[    0] =                                WORKED_Entity_Arrive_Time  
1160.000    1160.000  
UM_Model_02.Alma_(#173).System_Attribute[    1] =                                WORKED_Entity_Terminate_Time  
-1    Entity is staying in "__{TIn_Object}"
```

```
UM_Model_02.Alma_(#173).Number_Of_Content_Entities =0
```

```
-----  
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_
```

```
#####  
#####  
ENTITYLIST[    17]
```

```

ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_
+++++
UM_Model_02.Alma_(#174).DESEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at 0x00000214A09AF880>
(ENTITYLIST)

UM_Model_02.Alma_(#174).Name_Of_Entity_str =Alma_(#174)
UM_Model_02.Alma_(#174).Borning_Time      = 0:00:18:16.000
UM_Model_02.Alma_(#174).Terminate_Time = Entity is staying in "BUFFER2_Before_Machine__{TIn_Object}"

UM_Model_02.Alma_(#174).InputChannel_Index_Of_Arrive =0
UM_Model_02.Alma_(#174).OutputChannel_Index_Of_Leave =0

UM_Model_02.Alma_(#174).System_Attribute[ 0] =                WORKED_Entity_Arrive_Time
1160.000    1160.000
UM_Model_02.Alma_(#174).System_Attribute[ 1] =                WORKED_Entity_Terminate_Time
-1    Entity is staying in "__{TIn_Object}"

UM_Model_02.Alma_(#174).Number_Of_Content_Entities =0
-----
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_

#####
#####
ENTITYLIST[    18]

ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_
+++++
UM_Model_02.Alma_(#175).DESEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at 0x00000214A09AF880>
(ENTITYLIST)

UM_Model_02.Alma_(#175).Name_Of_Entity_str =Alma_(#175)
UM_Model_02.Alma_(#175).Borning_Time      = 0:00:18:24.000
UM_Model_02.Alma_(#175).Terminate_Time = Entity is staying in "BUFFER2_Before_Machine__{TIn_Object}"

UM_Model_02.Alma_(#175).InputChannel_Index_Of_Arrive =0
UM_Model_02.Alma_(#175).OutputChannel_Index_Of_Leave =0

```

```

UM_Model_02.Alma_(#175).System_Attribute[ 0] =          WORKED_Entity_Arrive_Time
1160.000  1160.000
UM_Model_02.Alma_(#175).System_Attribute[ 1] =          WORKED_Entity_Terminate_Time
-1  Entity is staying in "__{TIn_Object}"

UM_Model_02.Alma_(#175).Number_Of_Content_Entities =0
-----
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_

#####
#####
ENTITYLIST[ 19]

ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_
+++++++
UM_Model_02.Alma_(#176).DESEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at 0x00000214A09AF880>
(ENTITYLIST)

UM_Model_02.Alma_(#176).Name_Of_Entity_str =Alma_(#176)
UM_Model_02.Alma_(#176).Borning_Time  =  0:00:18:32.000
UM_Model_02.Alma_(#176).Terminate_Time = Entity is staying in "BUFFER2_Before_Machine__{TIn_Object}"

UM_Model_02.Alma_(#176).InputChannel_Index_Of_Arrive =0
UM_Model_02.Alma_(#176).OutputChannel_Index_Of_Leave =0

UM_Model_02.Alma_(#176).System_Attribute[ 0] =          WORKED_Entity_Arrive_Time
1190.000  1190.000
UM_Model_02.Alma_(#176).System_Attribute[ 1] =          WORKED_Entity_Terminate_Time
-1  Entity is staying in "__{TIn_Object}"

UM_Model_02.Alma_(#176).Number_Of_Content_Entities =0
-----
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_

```

```
#####
#####
ENTITYLIST[    20]

ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_
+++++++
UM_Model_02.Alma_(#177).DESEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at 0x00000214A09AF880>
(ENTITYLIST)

UM_Model_02.Alma_(#177).Name_Of_Entity_str =Alma_(#177)
UM_Model_02.Alma_(#177).Borning_Time      =  0:00:18:40.000
UM_Model_02.Alma_(#177).Terminate_Time = Entity is staying in "BUFFER2_Before_Machine__{TIn_Object}"

UM_Model_02.Alma_(#177).InputChannel_Index_Of_Arrive =0
UM_Model_02.Alma_(#177).OutputChannel_Index_Of_Leave =0

UM_Model_02.Alma_(#177).System_Attribute[    0] =                WORKED_Entity_Arrive_Time
1190.000    1190.000
UM_Model_02.Alma_(#177).System_Attribute[    1] =                WORKED_Entity_Terminate_Time
-1    Entity is staying in "__{TIn_Object}"

UM_Model_02.Alma_(#177).Number_Of_Content_Entities =0
-----
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_

#####
#####
ENTITYLIST[    21]

ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_
+++++++
UM_Model_02.Alma_(#178).DESEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at 0x00000214A09AF880>
(ENTITYLIST)
```

```

UM_Model_02.Alma_(#178).Name_Of_Entity_str =Alma_(#178)
UM_Model_02.Alma_(#178).Borning_Time      = 0:00:18:48.000
UM_Model_02.Alma_(#178).Terminate_Time = Entity is staying in "BUFFER2_Before_Machine__{TIn_Object}"

UM_Model_02.Alma_(#178).InputChannel_Index_Of_Arrive =0
UM_Model_02.Alma_(#178).OutputChannel_Index_Of_Leave =0

UM_Model_02.Alma_(#178).System_Attribute[ 0] =          WORKED_Entity_Arrive_Time
1190.000    1190.000
UM_Model_02.Alma_(#178).System_Attribute[ 1] =          WORKED_Entity_Terminate_Time
-1    Entity is staying in "__{TIn_Object}"

UM_Model_02.Alma_(#178).Number_Of_Content_Entities =0
-----
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_

#####
#####
ENTITYLIST[    22]

ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_
+++++++
UM_Model_02.Alma_(#179).DESEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at 0x00000214A09AF880>
(ENTITYLIST)

UM_Model_02.Alma_(#179).Name_Of_Entity_str =Alma_(#179)
UM_Model_02.Alma_(#179).Borning_Time      = 0:00:18:56.000
UM_Model_02.Alma_(#179).Terminate_Time = Entity is staying in "LOCK__{TAt_Output_Channel[0]}"

UM_Model_02.Alma_(#179).InputChannel_Index_Of_Arrive =0
UM_Model_02.Alma_(#179).OutputChannel_Index_Of_Leave =0

UM_Model_02.Alma_(#179).System_Attribute[ 0] =          WORKED_Entity_Arrive_Time
1190.000    1190.000
UM_Model_02.Alma_(#179).System_Attribute[ 1] =          WORKED_Entity_Terminate_Time
1190.000

```

```
UM_Model_02.Alma_(#179).Number_Of_Content_Entities =0
```

```
-----  
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_
```

```
#####
```

```
#####
```

```
ENTITYLIST[    23]
```

```
ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_
```

```
+++++
```

```
UM_Model_02.Alma_(#180).DESEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at 0x00000214A09AF880>  
(ENTITYLIST)
```

```
UM_Model_02.Alma_(#180).Name_Of_Entity_str =Alma_(#180)
```

```
UM_Model_02.Alma_(#180).Borning_Time    =  0:00:19:04.000
```

```
UM_Model_02.Alma_(#180).Terminate_Time = Entity is staying in "LOCK_{TIn_Object}"
```

```
UM_Model_02.Alma_(#180).InputChannel_Index_Of_Arrive =0
```

```
UM_Model_02.Alma_(#180).OutputChannel_Index_Of_Leave =0
```

```
UM_Model_02.Alma_(#180).System_Attribute[    0] =
```

```
1190.000    1190.000
```

```
WORKED_Entity_Arrive_Time
```

```
UM_Model_02.Alma_(#180).System_Attribute[    1] =
```

```
-1    Entity is staying in "__{TIn_Object}"
```

```
WORKED_Entity_Terminate_Time
```

```
UM_Model_02.Alma_(#180).Number_Of_Content_Entities =0
```

```
-----  
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_
```

```
#####
```

```
#####
```

```
ENTITYLIST[    24]
```



```

ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_
+++++
UM_Model_02.Alma_(#181).DESEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at 0x00000214A09AF880>
(ENTITYLIST)

UM_Model_02.Alma_(#181).Name_Of_Entity_str =Alma_(#181)
UM_Model_02.Alma_(#181).Borning_Time      = 0:00:19:12.000
UM_Model_02.Alma_(#181).Terminate_Time = Entity is staying in "LOCK__{TAt_Input_Channel[0]}"

UM_Model_02.Alma_(#181).InputChannel_Index_Of_Arrive =0
UM_Model_02.Alma_(#181).OutputChannel_Index_Of_Leave =0

UM_Model_02.Alma_(#181).System_Attribute[  0] =                WORKED_Entity_Arrive_Time
1152.000    1152.000
UM_Model_02.Alma_(#181).System_Attribute[  1] =                WORKED_Entity_Terminate_Time
1190.000

UM_Model_02.Alma_(#181).Number_Of_Content_Entities =0
-----
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_

#####
#####
ENTITYLIST[      25]

ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_
+++++
UM_Model_02.Alma_(#182).DESEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at 0x00000214A09AF880>
(ENTITYLIST)

UM_Model_02.Alma_(#182).Name_Of_Entity_str =Alma_(#182)
UM_Model_02.Alma_(#182).Borning_Time      = 0:00:19:20.000
UM_Model_02.Alma_(#182).Terminate_Time = Entity is staying in "BUFFER1_After_Route__{TAt_Output_Channel[0]}"

UM_Model_02.Alma_(#182).InputChannel_Index_Of_Arrive =0

```

```

UM_Model_02.Alma_(#182).OutputChannel_Index_Of_Leave =0

UM_Model_02.Alma_(#182).System_Attribute[ 0] =          WORKED_Entity_Arrive_Time
1160.000    1160.000
UM_Model_02.Alma_(#182).System_Attribute[ 1] =          WORKED_Entity_Terminate_Time
1190.000

UM_Model_02.Alma_(#182).Number_Of_Content_Entities =0
-----
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_

#####
#####
ENTITYLIST[      26]

ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_
+++++++
UM_Model_02.Alma_(#183).DESEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at 0x00000214A09AF880>
(ENTITYLIST)

UM_Model_02.Alma_(#183).Name_Of_Entity_str =Alma_(#183)
UM_Model_02.Alma_(#183).Borning_Time      = 0:00:19:28.000
UM_Model_02.Alma_(#183).Terminate_Time = Entity is staying in "BUFFER1_After_Route__{TIn_Object}"

UM_Model_02.Alma_(#183).InputChannel_Index_Of_Arrive =0
UM_Model_02.Alma_(#183).OutputChannel_Index_Of_Leave =0

UM_Model_02.Alma_(#183).System_Attribute[ 0] =          WORKED_Entity_Arrive_Time
1168.000    1168.000
UM_Model_02.Alma_(#183).System_Attribute[ 1] =          WORKED_Entity_Terminate_Time
-1    Entity is staying in "__{TIn_Object}"

UM_Model_02.Alma_(#183).Number_Of_Content_Entities =0
-----
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_

```

```
#####
#####
ENTITYLIST[    27]

ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_
+++++++
UM_Model_02.Alma_(#184).DESEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at 0x00000214A09AF880>
(ENTITYLIST)

UM_Model_02.Alma_(#184).Name_Of_Entity_str =Alma_(#184)
UM_Model_02.Alma_(#184).Borning_Time    =  0:00:19:36.000
UM_Model_02.Alma_(#184).Terminate_Time = Entity is staying in "BUFFER1_After_Route__{TIn_Object}"

UM_Model_02.Alma_(#184).InputChannel_Index_Of_Arrive =0
UM_Model_02.Alma_(#184).OutputChannel_Index_Of_Leave =0

UM_Model_02.Alma_(#184).System_Attribute[    0] =                WORKED_Entity_Arrive_Time
1176.000    1176.000
UM_Model_02.Alma_(#184).System_Attribute[    1] =                WORKED_Entity_Terminate_Time
-1    Entity is staying in "__{TIn_Object}"

UM_Model_02.Alma_(#184).Number_Of_Content_Entities =0
-----
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_

#####
#####
ENTITYLIST[    28]

ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_
+++++++
UM_Model_02.Alma_(#185).DESEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at 0x00000214A09AF880>
(ENTITYLIST)
```

```

UM_Model_02.Alma_(#185).Name_Of_Entity_str =Alma_(#185)
UM_Model_02.Alma_(#185).Borning_Time      = 0:00:19:44.000
UM_Model_02.Alma_(#185).Terminate_Time = Entity is staying in "BUFFER1_After_Route__{TIn_Object}"

UM_Model_02.Alma_(#185).InputChannel_Index_Of_Arrive =0
UM_Model_02.Alma_(#185).OutputChannel_Index_Of_Leave =0

UM_Model_02.Alma_(#185).System_Attribute[ 0] =                WORKED_Entity_Arrive_Time
1184.000    1184.000
UM_Model_02.Alma_(#185).System_Attribute[ 1] =                WORKED_Entity_Terminate_Time
-1    Entity is staying in "__{TIn_Object}"

UM_Model_02.Alma_(#185).Number_Of_Content_Entities =0
-----
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_

#####
#####
ENTITYLIST[      29]

ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_
+++++++
UM_Model_02.Alma_(#186).DESEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at 0x00000214A09AF880>
(ENTITYLIST)

UM_Model_02.Alma_(#186).Name_Of_Entity_str =Alma_(#186)
UM_Model_02.Alma_(#186).Borning_Time      = 0:00:19:52.000
UM_Model_02.Alma_(#186).Terminate_Time = Entity is staying in "BUFFER1_After_Route__{TIn_Object}"

UM_Model_02.Alma_(#186).InputChannel_Index_Of_Arrive =0
UM_Model_02.Alma_(#186).OutputChannel_Index_Of_Leave =0

UM_Model_02.Alma_(#186).System_Attribute[ 0] =                WORKED_Entity_Arrive_Time
1192.000    1192.000

```

```
UM_Model_02.Alma_(#186).System_Attribute[ 1] =          WORKED_Entity_Terminate_Time
-1 Entity is staying in "__{TIn_Object}"

UM_Model_02.Alma_(#186).Number_Of_Content_Entities =0
-----
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_

#####
#####
ENTITYLIST[      30]

ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_
+++++++
UM_Model_02.Alma_(#187).DESEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at 0x00000214A09AF880>
(ENTITYLIST)

UM_Model_02.Alma_(#187).Name_Of_Entity_str =Alma_(#187)
UM_Model_02.Alma_(#187).Borning_Time      = 0:00:20:00.000
UM_Model_02.Alma_(#187).Terminate_Time = Entity is staying in "BUFFER1_After_Route__{TIn_Object}"

UM_Model_02.Alma_(#187).InputChannel_Index_Of_Arrive =0
UM_Model_02.Alma_(#187).OutputChannel_Index_Of_Leave =0

UM_Model_02.Alma_(#187).System_Attribute[ 0] =          WORKED_Entity_Arrive_Time
1200.000 1200.000
UM_Model_02.Alma_(#187).System_Attribute[ 1] =          WORKED_Entity_Terminate_Time
-1 Entity is staying in "__{TIn_Object}"

UM_Model_02.Alma_(#187).Number_Of_Content_Entities =0
-----
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_
```

```
#####
#####
ENTITYLIST[      31]

ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_
+++++++
UM_Model_02.Alma_(#188).DESEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at 0x00000214A09AF880>
(ENTITYLIST)

UM_Model_02.Alma_(#188).Name_Of_Entity_str =Alma_(#188)
UM_Model_02.Alma_(#188).Bornig_Time      = 0:00:20:08.000
UM_Model_02.Alma_(#188).Terminate_Time = Entity is staying in "SOURCE1__{TAt_Output_Channel[0]}"

UM_Model_02.Alma_(#188).InputChannel_Index_Of_Arrive =0
UM_Model_02.Alma_(#188).OutputChannel_Index_Of_Leave =0

UM_Model_02.Alma_(#188).System_Attribute[  0] =                                WORKED_Entity_Arrive_Time
1208.000    1208.000
UM_Model_02.Alma_(#188).System_Attribute[  1] =                                WORKED_Entity_Terminate_Time
1208.000

UM_Model_02.Alma_(#188).Number_Of_Content_Entities =0
-----
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_
```

5.2.4 DES_Modell_02 TDES_SINKED_ENTITY list

Local time :Fri Oct 23 08:24:27 2020
 Model_Name : UM_Model_02

UM_Model_02.Print_DESEntityList_Short: (SINKED ENTITYLIST Result)

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Number of Entities = 120

GTime_Now [DDD:HH:MM:SS.XXX] = 0:00:20:08.000

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UM_Model_02.SINKED_ENTITYLIST[	i]	Entity_Name	Entity_Position
Borning_Time	Terminate_Time	Entity_Age	

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UM_Model_02.SINKED_ENTITYLIST[	0]	Alma_(#37)	(SINK1__{TIn_Object})
0:00:00:00.000	0:00:00:00.000	0:00:00:00.000	
UM_Model_02.SINKED_ENTITYLIST[	1]	Alma_(#38)	(SINK1__{TIn_Object})
0:00:00:08.000	0:00:00:20.000	0:00:00:12.000	
UM_Model_02.SINKED_ENTITYLIST[	2]	Alma_(#39)	(SINK1__{TIn_Object})
0:00:00:16.000	0:00:00:30.000	0:00:00:14.000	
UM_Model_02.SINKED_ENTITYLIST[	3]	Alma_(#40)	(SINK1__{TIn_Object})
0:00:00:24.000	0:00:00:40.000	0:00:00:16.000	
UM_Model_02.SINKED_ENTITYLIST[	4]	Alma_(#41)	(SINK1__{TIn_Object})
0:00:00:32.000	0:00:00:50.000	0:00:00:18.000	
UM_Model_02.SINKED_ENTITYLIST[	5]	Alma_(#42)	(SINK1__{TIn_Object})
0:00:00:40.000	0:00:01:00.000	0:00:00:20.000	
UM_Model_02.SINKED_ENTITYLIST[	6]	Alma_(#43)	(SINK1__{TIn_Object})
0:00:00:48.000	0:00:01:00.000	0:00:00:22.000	
UM_Model_02.SINKED_ENTITYLIST[	7]	Alma_(#44)	(SINK1__{TIn_Object})
0:00:00:56.000	0:00:01:20.000	0:00:00:24.000	

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UM_Model_02.SINKED_ENTITYLIST[      8] = Alma_(#45)  (SINK1__{TIn_Object})
0:00:01:04.000      0:00:01:30.000      0:00:00:26.000
UM_Model_02.SINKED_ENTITYLIST[      9] = Alma_(#46)  (SINK1__{TIn_Object})
0:00:01:12.000      0:00:01:40.000      0:00:00:28.000
UM_Model_02.SINKED_ENTITYLIST[     10] = Alma_(#47)  (SINK1__{TIn_Object})
0:00:01:20.000      0:00:01:50.000      0:00:00:30.000
UM_Model_02.SINKED_ENTITYLIST[     11] = Alma_(#48)  (SINK1__{TIn_Object})
0:00:01:28.000      0:00:02:00.000      0:00:00:32.000
UM_Model_02.SINKED_ENTITYLIST[     12] = Alma_(#49)  (SINK1__{TIn_Object})
0:00:01:36.000      0:00:02:00.000      0:00:00:34.000
UM_Model_02.SINKED_ENTITYLIST[     13] = Alma_(#50)  (SINK1__{TIn_Object})
0:00:01:44.000      0:00:02:20.000      0:00:00:36.000
UM_Model_02.SINKED_ENTITYLIST[     14] = Alma_(#51)  (SINK1__{TIn_Object})
0:00:01:52.000      0:00:02:30.000      0:00:00:38.000
UM_Model_02.SINKED_ENTITYLIST[     15] = Alma_(#52)  (SINK1__{TIn_Object})
0:00:02:00.000      0:00:02:40.000      0:00:00:40.000
UM_Model_02.SINKED_ENTITYLIST[     16] = Alma_(#53)  (SINK1__{TIn_Object})
0:00:02:08.000      0:00:02:50.000      0:00:00:42.000
UM_Model_02.SINKED_ENTITYLIST[     17] = Alma_(#54)  (SINK1__{TIn_Object})
0:00:02:16.000      0:00:03:00.000      0:00:00:44.000
UM_Model_02.SINKED_ENTITYLIST[     18] = Alma_(#55)  (SINK1__{TIn_Object})
0:00:02:24.000      0:00:03:00.000      0:00:00:46.000
UM_Model_02.SINKED_ENTITYLIST[     19] = Alma_(#56)  (SINK1__{TIn_Object})
0:00:02:32.000      0:00:03:20.000      0:00:00:48.000
UM_Model_02.SINKED_ENTITYLIST[     20] = Alma_(#57)  (SINK1__{TIn_Object})
0:00:02:40.000      0:00:03:30.000      0:00:00:50.000
UM_Model_02.SINKED_ENTITYLIST[     21] = Alma_(#58)  (SINK1__{TIn_Object})
0:00:02:48.000      0:00:03:40.000      0:00:00:52.000
UM_Model_02.SINKED_ENTITYLIST[     22] = Alma_(#59)  (SINK1__{TIn_Object})
0:00:02:56.000      0:00:03:50.000      0:00:00:54.000
UM_Model_02.SINKED_ENTITYLIST[     23] = Alma_(#60)  (SINK1__{TIn_Object})
0:00:03:04.000      0:00:04:00.000      0:00:00:56.000
UM_Model_02.SINKED_ENTITYLIST[     24] = Alma_(#61)  (SINK1__{TIn_Object})
0:00:03:12.000      0:00:04:00.000      0:00:00:58.000
UM_Model_02.SINKED_ENTITYLIST[     25] = Alma_(#62)  (SINK1__{TIn_Object})
0:00:03:20.000      0:00:04:20.000      0:00:01:00.000
UM_Model_02.SINKED_ENTITYLIST[     26] = Alma_(#63)  (SINK1__{TIn_Object})
0:00:03:28.000      0:00:04:30.000      0:00:01:02.000

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UM_Model_02.SINKED_ENTITYLIST[ 27] = Alma_(#64) (SINK1__{TIn_Object})
0:00:03:36.000      0:00:04:40.000      0:00:01:04.000
UM_Model_02.SINKED_ENTITYLIST[ 28] = Alma_(#65) (SINK1__{TIn_Object})
0:00:03:44.000      0:00:04:50.000      0:00:01:06.000
UM_Model_02.SINKED_ENTITYLIST[ 29] = Alma_(#66) (SINK1__{TIn_Object})
0:00:03:52.000      0:00:05:00.000      0:00:01:08.000
UM_Model_02.SINKED_ENTITYLIST[ 30] = Alma_(#67) (SINK1__{TIn_Object})
0:00:04:00.000      0:00:05:00.000      0:00:01:00.000
UM_Model_02.SINKED_ENTITYLIST[ 31] = Alma_(#68) (SINK1__{TIn_Object})
0:00:04:08.000      0:00:05:20.000      0:00:01:12.000
UM_Model_02.SINKED_ENTITYLIST[ 32] = Alma_(#69) (SINK1__{TIn_Object})
0:00:04:16.000      0:00:05:30.000      0:00:01:14.000
UM_Model_02.SINKED_ENTITYLIST[ 33] = Alma_(#70) (SINK1__{TIn_Object})
0:00:04:24.000      0:00:05:40.000      0:00:01:16.000
UM_Model_02.SINKED_ENTITYLIST[ 34] = Alma_(#71) (SINK1__{TIn_Object})
0:00:04:32.000      0:00:05:50.000      0:00:01:18.000
UM_Model_02.SINKED_ENTITYLIST[ 35] = Alma_(#72) (SINK1__{TIn_Object})
0:00:04:40.000      0:00:06:00.000      0:00:01:20.000
UM_Model_02.SINKED_ENTITYLIST[ 36] = Alma_(#73) (SINK1__{TIn_Object})
0:00:04:48.000      0:00:06:00.000      0:00:01:22.000
UM_Model_02.SINKED_ENTITYLIST[ 37] = Alma_(#74) (SINK1__{TIn_Object})
0:00:04:56.000      0:00:06:20.000      0:00:01:24.000
UM_Model_02.SINKED_ENTITYLIST[ 38] = Alma_(#75) (SINK1__{TIn_Object})
0:00:05:04.000      0:00:06:30.000      0:00:01:26.000
UM_Model_02.SINKED_ENTITYLIST[ 39] = Alma_(#76) (SINK1__{TIn_Object})
0:00:05:12.000      0:00:06:40.000      0:00:01:28.000
UM_Model_02.SINKED_ENTITYLIST[ 40] = Alma_(#77) (SINK1__{TIn_Object})
0:00:05:20.000      0:00:06:50.000      0:00:01:30.000
UM_Model_02.SINKED_ENTITYLIST[ 41] = Alma_(#78) (SINK1__{TIn_Object})
0:00:05:28.000      0:00:07:00.000      0:00:01:32.000
UM_Model_02.SINKED_ENTITYLIST[ 42] = Alma_(#79) (SINK1__{TIn_Object})
0:00:05:36.000      0:00:07:00.000      0:00:01:34.000
UM_Model_02.SINKED_ENTITYLIST[ 43] = Alma_(#80) (SINK1__{TIn_Object})
0:00:05:44.000      0:00:07:20.000      0:00:01:36.000
UM_Model_02.SINKED_ENTITYLIST[ 44] = Alma_(#81) (SINK1__{TIn_Object})
0:00:05:52.000      0:00:07:30.000      0:00:01:38.000
UM_Model_02.SINKED_ENTITYLIST[ 45] = Alma_(#82) (SINK1__{TIn_Object})
0:00:06:00.000      0:00:07:40.000      0:00:01:40.000

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UM_Model_02.SINKED_ENTITYLIST[ 46] = Alma_(#83) (SINK1__{TIn_Object})
0:00:06:08.000      0:00:07:50.000      0:00:01:42.000
UM_Model_02.SINKED_ENTITYLIST[ 47] = Alma_(#84) (SINK1__{TIn_Object})
0:00:06:16.000      0:00:08:00.000      0:00:01:44.000
UM_Model_02.SINKED_ENTITYLIST[ 48] = Alma_(#85) (SINK1__{TIn_Object})
0:00:06:24.000      0:00:08:00.000      0:00:01:46.000
UM_Model_02.SINKED_ENTITYLIST[ 49] = Alma_(#86) (SINK1__{TIn_Object})
0:00:06:32.000      0:00:08:20.000      0:00:01:48.000
UM_Model_02.SINKED_ENTITYLIST[ 50] = Alma_(#87) (SINK1__{TIn_Object})
0:00:06:40.000      0:00:08:30.000      0:00:01:50.000
UM_Model_02.SINKED_ENTITYLIST[ 51] = Alma_(#88) (SINK1__{TIn_Object})
0:00:06:48.000      0:00:08:40.000      0:00:01:52.000
UM_Model_02.SINKED_ENTITYLIST[ 52] = Alma_(#89) (SINK1__{TIn_Object})
0:00:06:56.000      0:00:08:50.000      0:00:01:54.000
UM_Model_02.SINKED_ENTITYLIST[ 53] = Alma_(#90) (SINK1__{TIn_Object})
0:00:07:04.000      0:00:09:00.000      0:00:01:56.000
UM_Model_02.SINKED_ENTITYLIST[ 54] = Alma_(#91) (SINK1__{TIn_Object})
0:00:07:12.000      0:00:09:00.000      0:00:01:58.000
UM_Model_02.SINKED_ENTITYLIST[ 55] = Alma_(#92) (SINK1__{TIn_Object})
0:00:07:20.000      0:00:09:20.000      0:00:02:00.000
UM_Model_02.SINKED_ENTITYLIST[ 56] = Alma_(#93) (SINK1__{TIn_Object})
0:00:07:28.000      0:00:09:30.000      0:00:02:02.000
UM_Model_02.SINKED_ENTITYLIST[ 57] = Alma_(#94) (SINK1__{TIn_Object})
0:00:07:36.000      0:00:09:40.000      0:00:02:04.000
UM_Model_02.SINKED_ENTITYLIST[ 58] = Alma_(#95) (SINK1__{TIn_Object})
0:00:07:44.000      0:00:09:50.000      0:00:02:06.000
UM_Model_02.SINKED_ENTITYLIST[ 59] = Alma_(#96) (SINK1__{TIn_Object})
0:00:07:52.000      0:00:10:00.000      0:00:02:08.000
UM_Model_02.SINKED_ENTITYLIST[ 60] = Alma_(#97) (SINK1__{TIn_Object})
0:00:08:00.000      0:00:10:00.000      0:00:02:00.000
UM_Model_02.SINKED_ENTITYLIST[ 61] = Alma_(#98) (SINK1__{TIn_Object})
0:00:08:08.000      0:00:10:20.000      0:00:02:12.000
UM_Model_02.SINKED_ENTITYLIST[ 62] = Alma_(#99) (SINK1__{TIn_Object})
0:00:08:16.000      0:00:10:30.000      0:00:02:14.000
UM_Model_02.SINKED_ENTITYLIST[ 63] = Alma_(#100) (SINK1__{TIn_Object})
0:00:08:24.000      0:00:10:40.000      0:00:02:16.000
UM_Model_02.SINKED_ENTITYLIST[ 64] = Alma_(#101) (SINK1__{TIn_Object})
0:00:08:32.000      0:00:10:50.000      0:00:02:18.000

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UM_Model_02.SINKED_ENTITYLIST[ 65] = Alma_(#102) (SINK1__ {TIn_Object})
0:00:08:40.000      0:00:11:00.000      0:00:02:20.000
UM_Model_02.SINKED_ENTITYLIST[ 66] = Alma_(#103) (SINK1__ {TIn_Object})
0:00:08:48.000      0:00:11:00.000      0:00:02:22.000
UM_Model_02.SINKED_ENTITYLIST[ 67] = Alma_(#104) (SINK1__ {TIn_Object})
0:00:08:56.000      0:00:11:20.000      0:00:02:24.000
UM_Model_02.SINKED_ENTITYLIST[ 68] = Alma_(#105) (SINK1__ {TIn_Object})
0:00:09:04.000      0:00:11:30.000      0:00:02:26.000
UM_Model_02.SINKED_ENTITYLIST[ 69] = Alma_(#106) (SINK1__ {TIn_Object})
0:00:09:12.000      0:00:11:40.000      0:00:02:28.000
UM_Model_02.SINKED_ENTITYLIST[ 70] = Alma_(#107) (SINK1__ {TIn_Object})
0:00:09:20.000      0:00:11:50.000      0:00:02:30.000
UM_Model_02.SINKED_ENTITYLIST[ 71] = Alma_(#108) (SINK1__ {TIn_Object})
0:00:09:28.000      0:00:12:00.000      0:00:02:32.000
UM_Model_02.SINKED_ENTITYLIST[ 72] = Alma_(#109) (SINK1__ {TIn_Object})
0:00:09:36.000      0:00:12:00.000      0:00:02:34.000
UM_Model_02.SINKED_ENTITYLIST[ 73] = Alma_(#110) (SINK1__ {TIn_Object})
0:00:09:44.000      0:00:12:20.000      0:00:02:36.000
UM_Model_02.SINKED_ENTITYLIST[ 74] = Alma_(#111) (SINK1__ {TIn_Object})
0:00:09:52.000      0:00:12:30.000      0:00:02:38.000
UM_Model_02.SINKED_ENTITYLIST[ 75] = Alma_(#112) (SINK1__ {TIn_Object})
0:00:10:00.000      0:00:12:40.000      0:00:02:40.000
UM_Model_02.SINKED_ENTITYLIST[ 76] = Alma_(#113) (SINK1__ {TIn_Object})
0:00:10:08.000      0:00:12:50.000      0:00:02:42.000
UM_Model_02.SINKED_ENTITYLIST[ 77] = Alma_(#114) (SINK1__ {TIn_Object})
0:00:10:16.000      0:00:13:00.000      0:00:02:44.000
UM_Model_02.SINKED_ENTITYLIST[ 78] = Alma_(#115) (SINK1__ {TIn_Object})
0:00:10:24.000      0:00:13:00.000      0:00:02:46.000
UM_Model_02.SINKED_ENTITYLIST[ 79] = Alma_(#116) (SINK1__ {TIn_Object})
0:00:10:32.000      0:00:13:20.000      0:00:02:48.000
UM_Model_02.SINKED_ENTITYLIST[ 80] = Alma_(#117) (SINK1__ {TIn_Object})
0:00:10:40.000      0:00:13:30.000      0:00:02:50.000
UM_Model_02.SINKED_ENTITYLIST[ 81] = Alma_(#118) (SINK1__ {TIn_Object})
0:00:10:48.000      0:00:13:40.000      0:00:02:52.000
UM_Model_02.SINKED_ENTITYLIST[ 82] = Alma_(#119) (SINK1__ {TIn_Object})
0:00:10:56.000      0:00:13:50.000      0:00:02:54.000
UM_Model_02.SINKED_ENTITYLIST[ 83] = Alma_(#120) (SINK1__ {TIn_Object})
0:00:11:04.000      0:00:14:00.000      0:00:02:56.000

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UM_Model_02.SINKED_ENTITYLIST[ 84] = Alma_(#121) (SINK1__ {TIn_Object})
0:00:11:12.000      0:00:14:00.000      0:00:02:58.000
UM_Model_02.SINKED_ENTITYLIST[ 85] = Alma_(#122) (SINK1__ {TIn_Object})
0:00:11:20.000      0:00:14:20.000      0:00:03:00.000
UM_Model_02.SINKED_ENTITYLIST[ 86] = Alma_(#123) (SINK1__ {TIn_Object})
0:00:11:28.000      0:00:14:30.000      0:00:03:02.000
UM_Model_02.SINKED_ENTITYLIST[ 87] = Alma_(#124) (SINK1__ {TIn_Object})
0:00:11:36.000      0:00:14:40.000      0:00:03:04.000
UM_Model_02.SINKED_ENTITYLIST[ 88] = Alma_(#125) (SINK1__ {TIn_Object})
0:00:11:44.000      0:00:14:50.000      0:00:03:06.000
UM_Model_02.SINKED_ENTITYLIST[ 89] = Alma_(#126) (SINK1__ {TIn_Object})
0:00:11:52.000      0:00:15:00.000      0:00:03:08.000
UM_Model_02.SINKED_ENTITYLIST[ 90] = Alma_(#127) (SINK1__ {TIn_Object})
0:00:12:00.000      0:00:15:00.000      0:00:03:00.000
UM_Model_02.SINKED_ENTITYLIST[ 91] = Alma_(#128) (SINK1__ {TIn_Object})
0:00:12:08.000      0:00:15:20.000      0:00:03:12.000
UM_Model_02.SINKED_ENTITYLIST[ 92] = Alma_(#129) (SINK1__ {TIn_Object})
0:00:12:16.000      0:00:15:30.000      0:00:03:14.000
UM_Model_02.SINKED_ENTITYLIST[ 93] = Alma_(#130) (SINK1__ {TIn_Object})
0:00:12:24.000      0:00:15:40.000      0:00:03:16.000
UM_Model_02.SINKED_ENTITYLIST[ 94] = Alma_(#131) (SINK1__ {TIn_Object})
0:00:12:32.000      0:00:15:50.000      0:00:03:18.000
UM_Model_02.SINKED_ENTITYLIST[ 95] = Alma_(#132) (SINK1__ {TIn_Object})
0:00:12:40.000      0:00:16:00.000      0:00:03:20.000
UM_Model_02.SINKED_ENTITYLIST[ 96] = Alma_(#133) (SINK1__ {TIn_Object})
0:00:12:48.000      0:00:16:00.000      0:00:03:22.000
UM_Model_02.SINKED_ENTITYLIST[ 97] = Alma_(#134) (SINK1__ {TIn_Object})
0:00:12:56.000      0:00:16:20.000      0:00:03:24.000
UM_Model_02.SINKED_ENTITYLIST[ 98] = Alma_(#135) (SINK1__ {TIn_Object})
0:00:13:04.000      0:00:16:30.000      0:00:03:26.000
UM_Model_02.SINKED_ENTITYLIST[ 99] = Alma_(#136) (SINK1__ {TIn_Object})
0:00:13:12.000      0:00:16:40.000      0:00:03:28.000
UM_Model_02.SINKED_ENTITYLIST[ 100] = Alma_(#137) (SINK1__ {TIn_Object})
0:00:13:20.000      0:00:16:50.000      0:00:03:30.000
UM_Model_02.SINKED_ENTITYLIST[ 101] = Alma_(#138) (SINK1__ {TIn_Object})
0:00:13:28.000      0:00:17:00.000      0:00:03:32.000
UM_Model_02.SINKED_ENTITYLIST[ 102] = Alma_(#139) (SINK1__ {TIn_Object})
0:00:13:36.000      0:00:17:00.000      0:00:03:34.000

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UM_Model_02.SINKED_ENTITYLIST[ 103] = Alma_ (#140)  (SINK1__ {TIn_Object})
0:00:13:44.000      0:00:17:20.000      0:00:03:36.000
UM_Model_02.SINKED_ENTITYLIST[ 104] = Alma_ (#141)  (SINK1__ {TIn_Object})
0:00:13:52.000      0:00:17:30.000      0:00:03:38.000
UM_Model_02.SINKED_ENTITYLIST[ 105] = Alma_ (#142)  (SINK1__ {TIn_Object})
0:00:14:00.000      0:00:17:40.000      0:00:03:40.000
UM_Model_02.SINKED_ENTITYLIST[ 106] = Alma_ (#143)  (SINK1__ {TIn_Object})
0:00:14:08.000      0:00:17:50.000      0:00:03:42.000
UM_Model_02.SINKED_ENTITYLIST[ 107] = Alma_ (#144)  (SINK1__ {TIn_Object})
0:00:14:16.000      0:00:18:00.000      0:00:03:44.000
UM_Model_02.SINKED_ENTITYLIST[ 108] = Alma_ (#145)  (SINK1__ {TIn_Object})
0:00:14:24.000      0:00:18:00.000      0:00:03:46.000
UM_Model_02.SINKED_ENTITYLIST[ 109] = Alma_ (#146)  (SINK1__ {TIn_Object})
0:00:14:32.000      0:00:18:20.000      0:00:03:48.000
UM_Model_02.SINKED_ENTITYLIST[ 110] = Alma_ (#147)  (SINK1__ {TIn_Object})
0:00:14:40.000      0:00:18:30.000      0:00:03:50.000
UM_Model_02.SINKED_ENTITYLIST[ 111] = Alma_ (#148)  (SINK1__ {TIn_Object})
0:00:14:48.000      0:00:18:40.000      0:00:03:52.000
UM_Model_02.SINKED_ENTITYLIST[ 112] = Alma_ (#149)  (SINK1__ {TIn_Object})
0:00:14:56.000      0:00:18:50.000      0:00:03:54.000
UM_Model_02.SINKED_ENTITYLIST[ 113] = Alma_ (#150)  (SINK1__ {TIn_Object})
0:00:15:04.000      0:00:19:00.000      0:00:03:56.000
UM_Model_02.SINKED_ENTITYLIST[ 114] = Alma_ (#151)  (SINK1__ {TIn_Object})
0:00:15:12.000      0:00:19:00.000      0:00:03:58.000
UM_Model_02.SINKED_ENTITYLIST[ 115] = Alma_ (#152)  (SINK1__ {TIn_Object})
0:00:15:20.000      0:00:19:20.000      0:00:04:00.000
UM_Model_02.SINKED_ENTITYLIST[ 116] = Alma_ (#153)  (SINK1__ {TIn_Object})
0:00:15:28.000      0:00:19:30.000      0:00:04:02.000
UM_Model_02.SINKED_ENTITYLIST[ 117] = Alma_ (#154)  (SINK1__ {TIn_Object})
0:00:15:36.000      0:00:19:40.000      0:00:04:04.000
UM_Model_02.SINKED_ENTITYLIST[ 118] = Alma_ (#155)  (SINK1__ {TIn_Object})
0:00:15:44.000      0:00:19:50.000      0:00:04:06.000
UM_Model_02.SINKED_ENTITYLIST[ 119] = Alma_ (#156)  (SINK1__ {TIn_Object})
0:00:15:52.000      0:00:20:00.000      0:00:04:08.000

```

5.2.5 DES_Modell_02 TDES_TASK list

Local time :Fri Oct 23 08:24:27 2020
 Model_Name : UM_Model_02

UM_Model_02.Print_DESBranch_TaskList:

=====

Number of DES_Tasks = 5

GTime_Now [DDD:HH:MM:SS.XXX] = 0:00:20:08.000

=====

=====

=====

UM_Model_02.DESTaskList [i] =	TaskTime	Sender_Name	DESOBJECT_Type	Command	Process#
State Content					

=====

=====

=====

UM_Model_02.DESTaskList [0] =	0:00:20:08.000	SOURCE1	TSOURCE	TDESOBJECT_Next_State	0

TIIdle >nil>-[x]->#188,x,x,x,x,x>

UM_Model_02.DESTaskList [1] =	0:00:20:08.000	SOURCE1	TSOURCE	TENTITY_Move_Request	0

TIIdle >nil>-[x]->#188,x,x,x,x,x>

UM_Model_02.DESTaskList [2] =	0:00:20:08.000	SOURCE1	TSOURCE	TENTITY_Move_Request	0

TIIdle >nil>-[x]->#188,x,x,x,x,x>

UM_Model_02.DESTaskList [3] =	0:00:20:00.000	MACHINE1	TMACHINE	TDESOBJECT_Next_State	0

TBusy >#158,x,x,x,x,x>-[#157]->x,x,x,x,x,x>

UM_Model_02.DESTaskList [4] =	0:00:20:16.000	SOURCE1	TSOURCE	TDESOBJECT_Next_State	0

TIIdle >nil>-[x]->#188,x,x,x,x,x>

5.2.6 DES_Modell_02 TBUFFER occupancy list

Local time :Fri Oct 23 08:24:27 2020

Model_Name : UM_Model_02

UM_Model_02.Print_Content_Entities_Vector_Occupancy:

=====

Number of DESObjects = 3

GTime_Now [DDD:HH:MM:SS.XXX] = 0:00:20:08.000

UM_Model_02.DESBranch_DESObjectList[0].DESObject_Name_str = BUFFER1_After_Route (Type = TBUFFER)

(Content) Percent%

(0)	88.36%	*****
(1)	2.74%	**
(2)	2.74%	**
(3)	2.74%	**
(4)	2.05%	**
(5)	1.37%	*
(6)	0.00%	
(7)	0.00%	
(8)	0.00%	
(9)	0.00%	
(10)	0.00%	
(11)	0.00%	
(12)	0.00%	
(13)	0.00%	
(14)	0.00%	
(15)	0.00%	
(16)	0.00%	
(17)	0.00%	
(18)	0.00%	

```
(      19)    0.00% |
```

```
UM_Model_02.DESBranch_DESObjectList[      1].DESObject_Name_str = BUFFER2_Before_Machine      (Type = TBUFFER)
```

```
(Content) Percent%
(      0)    12.20% | *****
(      1)     3.25% | ***
(      2)     3.25% | ***
(      3)     3.25% | ***
(      4)     3.25% | ***
(      5)     3.25% | ***
(      6)     3.25% | ***
(      7)     3.25% | ***
(      8)     3.25% | ***
(      9)     3.25% | ***
(     10)     3.25% | ***
(     11)     3.25% | ***
(     12)     3.25% | ***
(     13)     3.25% | ***
(     14)     3.25% | ***
(     15)     3.25% | ***
(     16)     3.25% | ***
(     17)    10.57% | *****
(     18)    13.01% | *****
(     19)    12.20% | *****
```

```
UM_Model_02.DESBranch_DESObjectList[      2].DESObject_Name_str = BUFFER3_After_Machine      (Type = TBUFFER)
```

```
(Content) Percent%
(      0)   100.00%
| *****
(      1)     0.00% |
(      2)     0.00% |
(      3)     0.00% |
(      4)     0.00% |
```


(	5)	0.00%	
(	6)	0.00%	
(	7)	0.00%	
(	8)	0.00%	
(	9)	0.00%	
(	10)	0.00%	
(	11)	0.00%	
(	12)	0.00%	
(	13)	0.00%	
(	14)	0.00%	
(	15)	0.00%	
(	16)	0.00%	
(	17)	0.00%	
(	18)	0.00%	
(	19)	0.00%	

End of "UM_Model_02.Print_TBUFFEs_Occupancy"

5.2.7 DES_Model_02 Program results

Run of "DES_Single_DESBranch.py" has started!

Local time :Fri Oct 23 08:24:27 2020

Model_Name : UM_Model_02

UM_Model_02.Print ObjectList Short:

Number of DESObjects = 8

GTime_Now [DDD:HH:MM:SS.XXX] = 0:00:00:00.000

```
=====
UM_Model_02.DESObjectList[  i] =          DESObject_Name  DESObject_Type      State
Last_Calculation_Time      DESObject_Content
=====
=====
UM_Model_02.DESObjectList[  0] =          BUFFER1_After_Route      TBUFFER      TIdle
0:00:00:00.000      >x,x,x,x,x,x>-[x]->x,x,x,x,x,x>      (Buffer is EMPTY      Capacity = 20)
UM_Model_02.DESObjectList[  1] =          BUFFER2_Before_Machine      TBUFFER      TIdle
0:00:00:00.000      >x,x,x,x,x,x>-[x]->x,x,x,x,x,x>      (Buffer is EMPTY      Capacity = 20)
UM_Model_02.DESObjectList[  2] =          BUFFER3_After_Machine      TBUFFER      TIdle
0:00:00:00.000      >x,x,x,x,x,x>-[x]->x,x,x,x,x,x>      (Buffer is EMPTY      Capacity = 20)
UM_Model_02.DESObjectList[  3] =          LOCK      TLOCK      TIdle
0:00:00:00.000      >x>-[x]->x,x>      (Segment's maximum Entity content = 0)
UM_Model_02.DESObjectList[  4] =          MACHINE1      TMACHINE      TIdle
0:00:00:00.000      >x,x,x,x,x,x>-[x]->x,x,x,x,x,x>      (Capacity = 1)
UM_Model_02.DESObjectList[  5] =          SINK1      TSINK      TIdle
0:00:00:00.000      >x,x,x,x,x,x>-[x]->nil>
UM_Model_02.DESObjectList[  6] =          SOURCE1      TSOURCE      TIdle
0:00:00:00.000      >nil>-[x]->x,x,x,x,x,x>      (Capacity = 1)
```

```

UM_Model_02.DESObjectList[ 7] =          UNLOCK          TUNLOCK          TIdle
0:00:00:00.000          >x,x>-[x]->x>

```

```

UM_Model_02.DESBranch_Insert_First_DESTask_Of_SOURCES_Into_DESTaskList
=====

```

```

UM_Model_02.Print_DESBranch_TaskList:
=====

```

```

Number of DES_Tasks = 1
GTime_Now [DDD:HH:MM:SS.XXX] = 0:00:00:00.000
=====

```

```

=====
UM_Model_02.DESTaskList [ i] =          TaskTimeSender_Name  DESObject_Type          Command  Process#
State      Content
=====

```

```

=====
UM_Model_02.DESTaskList [ 0] = 0:00:00:00.000  SOURCE1          TSOURCE  TDESOBJECT_Next_State          0
TIdle      >nil>-[x]->x,x,x,x,x,x,x>

```

```

UM_Model_02.DESBranch_Calculate_Next_DESTask:
=====

```

```

DES_Time_Now = 0:00:17:20.000  Elapsed Real Time = 0:00:00:00.277  Ratio = 3755.114  DES_cycle =
5000  len(ENTITYLIST) = 27  len(SINKED_ENTITYLIST) = 104

```

```

UM_Model_02.Print_DESEntityList_Short: (ENTITYLIST Result)
=====

```

```

Number of Entities = 32
GTime_Now [DDD:HH:MM:SS.XXX] = 0:00:20:08.000

```

```

=====
UM_Model_02.ENTITYLIST[      i] = Entity_Name  Entity_Position
Entity_Content
=====
=====
UM_Model_02.ENTITYLIST[      0] = Alma_(#157)  (MACHINE1__{TIn_Object})
UM_Model_02.ENTITYLIST[      1] = Alma_(#158)  (MACHINE1__{TAt_Input_Channel[0]})
UM_Model_02.ENTITYLIST[      2] = Alma_(#159)  (BUFFER2_Before_Machine__{TAt_Output_Channel[0]})
UM_Model_02.ENTITYLIST[      3] = Alma_(#160)  (BUFFER2_Before_Machine__{TIn_Object})
UM_Model_02.ENTITYLIST[      4] = Alma_(#161)  (BUFFER2_Before_Machine__{TIn_Object})
UM_Model_02.ENTITYLIST[      5] = Alma_(#162)  (BUFFER2_Before_Machine__{TIn_Object})
UM_Model_02.ENTITYLIST[      6] = Alma_(#163)  (BUFFER2_Before_Machine__{TIn_Object})
UM_Model_02.ENTITYLIST[      7] = Alma_(#164)  (BUFFER2_Before_Machine__{TIn_Object})
UM_Model_02.ENTITYLIST[      8] = Alma_(#165)  (BUFFER2_Before_Machine__{TIn_Object})
UM_Model_02.ENTITYLIST[      9] = Alma_(#166)  (BUFFER2_Before_Machine__{TIn_Object})
UM_Model_02.ENTITYLIST[     10] = Alma_(#167)  (BUFFER2_Before_Machine__{TIn_Object})
UM_Model_02.ENTITYLIST[     11] = Alma_(#168)  (BUFFER2_Before_Machine__{TIn_Object})
UM_Model_02.ENTITYLIST[     12] = Alma_(#169)  (BUFFER2_Before_Machine__{TIn_Object})
UM_Model_02.ENTITYLIST[     13] = Alma_(#170)  (BUFFER2_Before_Machine__{TIn_Object})
UM_Model_02.ENTITYLIST[     14] = Alma_(#171)  (BUFFER2_Before_Machine__{TIn_Object})
UM_Model_02.ENTITYLIST[     15] = Alma_(#172)  (BUFFER2_Before_Machine__{TIn_Object})
UM_Model_02.ENTITYLIST[     16] = Alma_(#173)  (BUFFER2_Before_Machine__{TIn_Object})
UM_Model_02.ENTITYLIST[     17] = Alma_(#174)  (BUFFER2_Before_Machine__{TIn_Object})
UM_Model_02.ENTITYLIST[     18] = Alma_(#175)  (BUFFER2_Before_Machine__{TIn_Object})
UM_Model_02.ENTITYLIST[     19] = Alma_(#176)  (BUFFER2_Before_Machine__{TIn_Object})
UM_Model_02.ENTITYLIST[     20] = Alma_(#177)  (BUFFER2_Before_Machine__{TIn_Object})
UM_Model_02.ENTITYLIST[     21] = Alma_(#178)  (BUFFER2_Before_Machine__{TIn_Object})
UM_Model_02.ENTITYLIST[     22] = Alma_(#179)  (LOCK__{TAt_Output_Channel[0]})
UM_Model_02.ENTITYLIST[     23] = Alma_(#180)  (LOCK__{TIn_Object})
UM_Model_02.ENTITYLIST[     24] = Alma_(#181)  (LOCK__{TAt_Input_Channel[0]})
UM_Model_02.ENTITYLIST[     25] = Alma_(#182)  (BUFFER1_After_Route__{TAt_Output_Channel[0]})
UM_Model_02.ENTITYLIST[     26] = Alma_(#183)  (BUFFER1_After_Route__{TIn_Object})
UM_Model_02.ENTITYLIST[     27] = Alma_(#184)  (BUFFER1_After_Route__{TIn_Object})
UM_Model_02.ENTITYLIST[     28] = Alma_(#185)  (BUFFER1_After_Route__{TIn_Object})
UM_Model_02.ENTITYLIST[     29] = Alma_(#186)  (BUFFER1_After_Route__{TIn_Object})
UM_Model_02.ENTITYLIST[     30] = Alma_(#187)  (BUFFER1_After_Route__{TIn_Object})

```

```
UM_Model_02.ENTITYLIST[ 31] = Alma_(#188) (SOURCE1__{TAt_Output_Channel[0]})
```

```
UM_Model_02.Print ObjectList Short:
```

```
Number of DESObjects = 8
```

```
GTime_Now [DDD:HH:MM:SS.XXX] = 0:00:20:08.000
```

```
=====
UM_Model_02.DESObjectList[ i] =          DESObject_Name  DESObject_Type      State
Last_Calculation_Time      DESObject_Content
=====
```

```
=====
UM_Model_02.DESObjectList[ 0] =          BUFFER1_After_Route      TBUFFER      TIdle
0:00:20:00.000      >x,x,x,x,x,x,x>-[#187, #186, #185, #184, #183]->#182,x,x,x,x,x,x>      (Buffer is NOT EMPTY!
Capacity = 20      Occupancy = 25.00%)
UM_Model_02.DESObjectList[ 1] =          BUFFER2_Before_Machine      TBUFFER      TBlocked
0:00:20:00.000      >{x},{x},{x},{x},{x},{x}>-[#178, #177, #176, #175, #174, #173, #172, #171, #170, #169,
#168, #167, #166, #165, #164, #163, #162, #161, #160]->#159,x,x,x,x,x,x>
(Buffer is NOT EMPTY!      Capacity = 20      Occupancy = 95.00%)
UM_Model_02.DESObjectList[ 2] =          BUFFER3_After_Machine      TBUFFER      TIdle
0:00:20:00.000      >x,x,x,x,x,x,x>-[x]->x,x,x,x,x,x,x>      (Buffer is EMPTY      Capacity = 20)
UM_Model_02.DESObjectList[ 3] =          LOCK      TLOCK      TBusy
0:00:19:50.000      >#181>-[#180]->#179,x>(Segment's maximum Entity content = 25)
UM_Model_02.DESObjectList[ 4] =          MACHINE1      TMACHINE      TBusy
0:00:20:00.000      >#158,x,x,x,x,x,x>-[#157]->x,x,x,x,x,x,x>      (Capacity = 1)
UM_Model_02.DESObjectList[ 5] =          SINK1      TSINK      TIdle
0:00:20:00.000      >x,x,x,x,x,x,x>-[x]->nil>
UM_Model_02.DESObjectList[ 6] =          SOURCE1      TSOURCE      TIdle
0:00:20:08.000      >nil>-[x]->#188,x,x,x,x,x,x>      (Capacity = 1)
UM_Model_02.DESObjectList[ 7] =          UNLOCK      TUNLOCK      TIdle
0:00:20:00.000      >x,x>-[x]->x>
```

```
UM_Model_02.Print_DESObjectList_Summary_Report (page 1 of 3):
```

```
=====
Number of DESObjects = 8
GTime_Now [DDD:HH:MM:SS.XXX] = 0:00:20:08.000
=====
```

```
=====
UM_Model_02.DESObjectList[ i] =          DESObject_Name  DESObject_Type    Current_Content
Average_Content    Input_Entities#    Output_Entities#    Average_Staying_Time
=====
=====
UM_Model_02.DESObjectList[ 0] =          BUFFER1_After_Route          TBUFFER          5 [entities]          0.315
[entities]          151          145          0:00:00:00.425
UM_Model_02.DESObjectList[ 1] =          BUFFER2_Before_Machine          TBUFFER          19 [entities]          10.878
[entities]          142          122          0:00:00:08.146
UM_Model_02.DESObjectList[ 2] =          BUFFER3_After_Machine          TBUFFER          0 [entities]          0.000
[entities]          120          120          0:00:00:00.000
UM_Model_02.DESObjectList[ 3] =          LOCK          TLOCK          1 [entities]
145          142          0:00:00:01.874
UM_Model_02.DESObjectList[ 4] =          MACHINE1          TMACHINE          1 [entities]
122          120          0:00:00:00.000
UM_Model_02.DESObjectList[ 5] =          SINK1          TSINK          0 [entities]
120          0          0:00:00:00.000
UM_Model_02.DESObjectList[ 6] =          SOURCE1          TSOURCE          0 [entities]
0          151          0:00:00:00.000
UM_Model_02.DESObjectList[ 7] =          UNLOCK          TUNLOCK          0 [entities]
120          120          0:00:00:00.000
=====
```

```
UM_Model_02.Print_DESObjectList_Summary_Report (page 2 of 3):
=====
```

```
Number of DESObjects = 8
GTime_Now [DDD:HH:MM:SS.XXX] = 0:00:20:08.000
=====
```

```
=====
UM_Model_02.DESObjectList[ i] =          DESObject_Name  DESObject_Type    in TIdle state [%]    in TBusy
state [%]    in TBlocked state[%]    in TFailed state [%]    in TPaused state [%]
=====
```

```

=====
=====
=====
UM_Model_02.DESObjectList[ 0] =      BUFFER1_After_Route      TBUFFER      100.00
0.00      0.00      0.00      0.00
UM_Model_02.DESObjectList[ 1] =      BUFFER2_Before_Machine      TBUFFER      89.07
0.00      10.93      0.00      0.00
UM_Model_02.DESObjectList[ 2] =      BUFFER3_After_Machine      TBUFFER      100.00
0.00      0.00      0.00      0.00
UM_Model_02.DESObjectList[ 3] =      LOCK      TLOCK      0.00
77.81      22.19      0.00      0.00
UM_Model_02.DESObjectList[ 4] =      MACHINE1      TMACHINE      0.00
100.00      0.00      0.00      0.00
UM_Model_02.DESObjectList[ 5] =      SINK1      TSINK      100.00
0.00      0.00      0.00      0.00
UM_Model_02.DESObjectList[ 6] =      SOURCE1      TSOURCE      100.00
0.00      0.00      0.00      0.00
UM_Model_02.DESObjectList[ 7] =      UNLOCK      TUNLOCK      1.49
98.51      0.00      0.00      0.00

```

UM_Model_02.Print_DESObjectList_Summary_Report (page 3 of 3):

```

=====
Number of DESObjects = 3
GTime_Now [DDD:HH:MM:SS.XXX] = 0:00:20:08.000

```

Occupancy of Content_Entities_Vector

```

=====
=====
=====
UM_Model_02.DESObjectList[ i] =      DESObject_Name      Oppupancy[%] of Content_Entities_Vector elements
=====
=====
UM_Model_02.DESObjectList[ 0] =      BUFFER1_After_Route = [ 88.36%, 2.74%, 2.74%, 2.74%, 2.05%,
1.37%, 0.00%, 0.00%, 0.00%, 0.00%,
0.00%, 0.00%, 0.00%, 0.00%, 0.00%, 0.00%, 0.00%, 0.00%, 0.00%,
0.00%,

```

```

]
UM_Model_02.DESObjectList[ 1] = BUFFER2_Before_Machine = [ 12.20%, 3.25%, 3.25%, 3.25%, 3.25%,
3.25%, 3.25%, 3.25%, 3.25%, 3.25%, 3.25%, 3.25%, 3.25%, 10.57%, 13.01%,
12.20%,
]
UM_Model_02.DESObjectList[ 2] = BUFFER3_After_Machine = [ 100.00%, 0.00%, 0.00%, 0.00%, 0.00%,
0.00%, 0.00%, 0.00%, 0.00%, 0.00%, 0.00%, 0.00%, 0.00%, 0.00%, 0.00%,
0.00%,
]
]

```

Number_Of_Succesful_Entity_Move_Requests = 920

```

Number_Of_Source_Call = 302 ( 9.52 %)
Number_Of_Buffer_Call = 1213 ( 38.25 %)
Number_Of_Machine_Call = 482 ( 15.20 %)
Number_Of_Sink_Call = 120 ( 3.78 %)
Number_Of_Wrapper_Call = 0 ( 0.00 %)
Number_Of_UnWrapper_Call = 0 ( 0.00 %)
Number_Of_Path_Call = 0 ( 0.00 %)
Number_Of_Lock_Call = 574 ( 18.10 %)
Number_Of_UnLock_Call = 480 ( 15.14 %)
=====
Summa_DESObject_Call = 3171 (100.00 %)

```

```

Number_Of_All_Objects_Call = 3171
Number_Of_All_Entity_Move_Requests = 2614
Number_Of_Process_Calculation_Cycles = 0
=====
Number_Of_All_Calculation_Cycles = 5785

```

Size of SINKED_ENTITYLIST = 120


```
Last Simulated Calculation Time [DAY:HH:MM:SS.XXX] = 0:00:20:08.000
DESBranch_Simulationtime_End ...[DAY:HH:MM:SS.XXX] = 0:00:20:00.000
```

```
Total Real Calculation Time [DAY:HH:MM:SS.XXX] = 0:00:00:00.320
```

```
Total Real Program Running Time [DAY:HH:MM:SS.XXX] = 0:00:00:00.345
```

```
Run of "DES_Single_DESBranch.py" has finished!
```

5.3 DES model 03

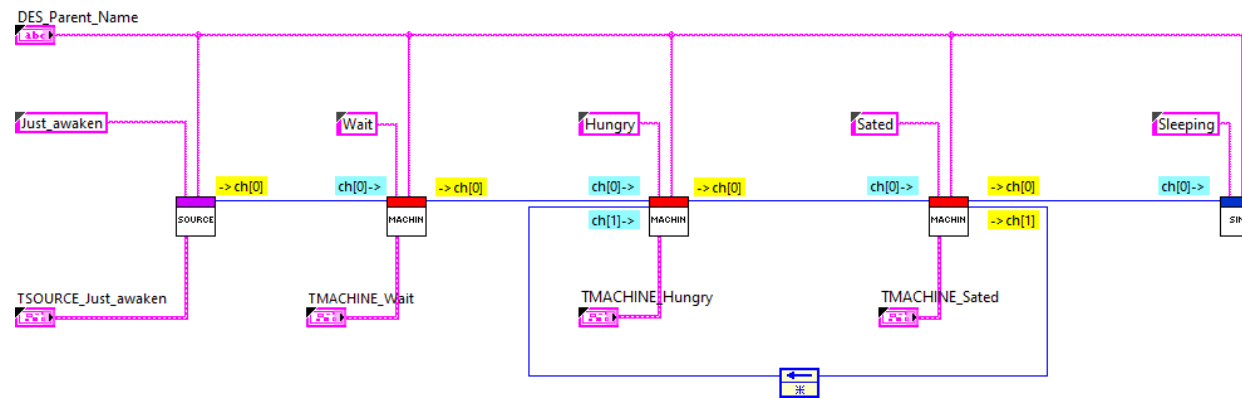


Figure 5.2.99 MODEL_03 block diagram in LabVIEW graphical editor

MODEL 03 (.mp4 film)

The meaning of the icons in the figure is:



is the icon for the Source (**TSOURCE**) DES object.



a Machine (**TMACHINE**) des objects of any.



is the icon of the Sink (**TSINK**) DES object.

ch[i]->

is the output of the DES object through the output channel i.

-> ch[k]

means the input to the DES object through the input channel k.

The simulation model is **Figure 5.2.100** Finite State Automatic Diagram: Daily Feeding is a visible *finite state automaton*.



Figure 5.2.100 MODEL_03 Daily Feeding

We ran the simulation for a period of one day!

TSOURCE_Just_awaken

SOURCE_Name_Of_Produced_Entity_str Person_State	SOURCE_Distribution TDistribution_Constant_Value	SOURCE_Maximum_Of_Time 0:00:00:03.000
SOURCE_First_Time_of_Entity_Creation 0:00:00:00.000 hour:minute:second.xxx	SOURCE_Constant_Value_Of_Time 0:00:00:01.000 hour:minute:second.xxx	SOURCE_Mean_Of_Time 0:00:00:31.000
SOURCE_Maximum_Batch_Size 1	SOURCE_Deviation_Of_Time 0:00:00:01.000 hour:minute:second.xxx	SOURCE_Usual_Of_Time 0:00:00:02.000
Capacity 1	OutputChannel_Index_Selection_Strategy TSelection_Random_Selected_Index	SOURCE_Minimum_Of_Time 0:00:00:01.000 hour:minute:second.xxx
	OutputChannel_Index 0	

Figure 5.3.101 MODEL_02/TSOURCE_Just_awaken parameter

TMACHINE_Wait

MACHINE_Distribution TDistribution_Constant_Value	MACHINE_ConstantValue_Of_Time 0:01:00:00.000	MACHINE_Maximum_Of_Time 0:00:00:03.000
Capacity 1	MACHINE_Mean_Of_Time 0:00:00:01.000	MACHINE_Usual_Of_Time 0:00:00:02.000
InputChannel_Index_Selection_Strategy TSelection_Random_Selected_Index	MACHINE_Deviation_Of_Time 0:00:00:01.000 hour:minute:second.xxx	MACHINE_Minimum_Of_Time 0:00:00:01.000 hour:minute:second.xxx
InputChannel_Index 0	OutputChannel_Index_Selection_Strategy TSelection_Random_Selected_Index	
	OutputChannel_Index 0	

Figure 5.3.102 MODEL_02/TMachine_Wait parameter

TMACHINE_Hungry

MACHINE_Distribution TDistribution_Constant_Value	MACHINE_ConstantValue_Of_Time 0:00:15:00.000	MACHINE_Maximum_Of_Time 0:00:00:03.000
Capacity 1	MACHINE_Mean_Of_Time 0:00:00:01.000	MACHINE_Usual_Of_Time 0:00:00:02.000
InputChannel_Index_Selection_Strategy TSelection_Random_Selected_Index	MACHINE_Deviation_Of_Time 0:00:00:01.000 hour:minute:second.xxx	MACHINE_Minimum_Of_Time 0:00:00:01.000 hour:minute:second.xxx
InputChannel_Index 0	OutputChannel_Index_Selection_Strategy TSelection_Random_Selected_Index	
	OutputChannel_Index 0	

Figure 5.3.103 MODEL_02 TMachine_Hungry parameter

TMACHINE_Sated

MACHINE_Distribution	MACHINE_ConstantValue_Of_Time	MACHINE_Maximum_Of_Time
TDistribution_Constant_Value	0:05:00:00.000	0:00:00:03.000
	MACHINE_Mean_Of_Time	MACHINE_Usual_Of_Time
	0:00:00:01.000	0:00:00:02.000
Capacity	MACHINE_Deviation_Of_Time	MACHINE_Minimum_Of_Time
1	0:00:00:01.000	0:00:00:01.000
	hour:minute:second.xxx	hour:minute:second.xxx
InputChannel_Index_Selection_Strategy	OutputChannel_Index_Selection_Strategy	
TSelection_Random_Selected_Index	TSelection_Random_Selected_Index	
InputChannel_Index	OutputChannel_Index	
0	0	

Figure 5.3.104 MODEL_02 TMachine_Sated parameter

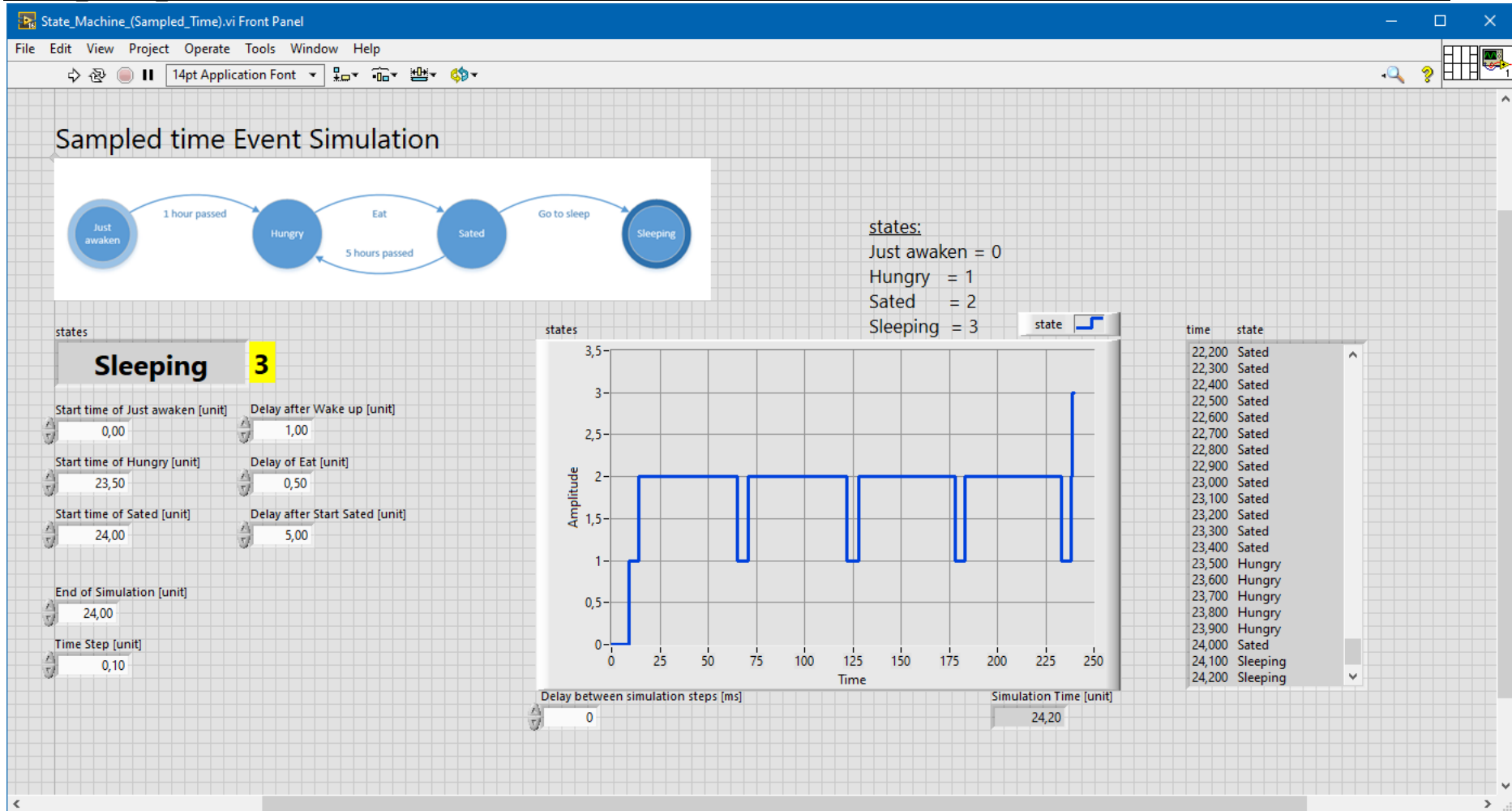


Figure 5.3.105 MODEL_02 LabVIEW Front Panel (width sample time)

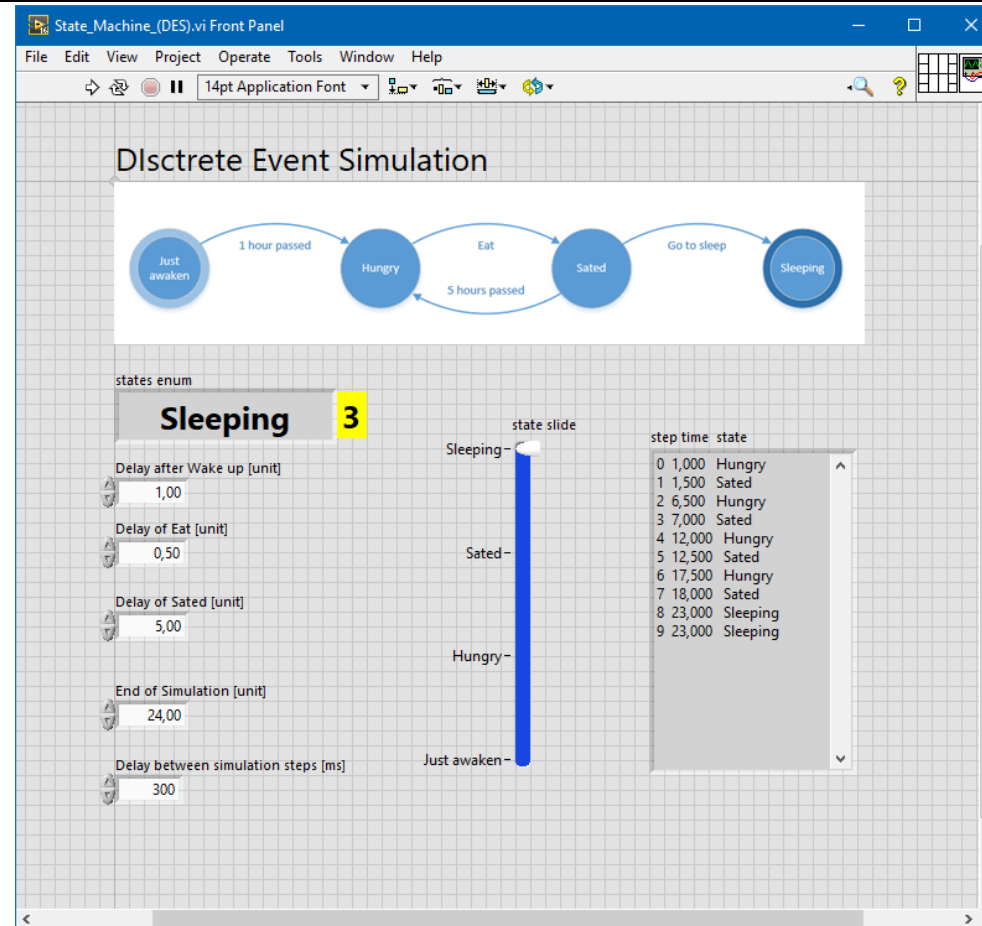


Figure 5.3.106 MODEL_02 LabVIEW program's Front Panel (width discrete event simulatin)

5.3.1 DES_Modell_03 Python program list

```
#####
#####
import sys
import time
from TDES_TYPES import *
from TDES_CHANNEL import *
from TDES_CONNECTION import *
from TDES_TASK import *
from TDES_ENTITY import *
from TDES_ENTITYLIST import *
from TDES_OBJECT import *
from TDES_BRANCH import *

#####
#####
#####
#####

class TUM_Model_03:

    #&&&&
    # 2020. 10. 22. 17:40:08

    def __init__(
        self,
        Model_Name_str,
    ):

        Branch = TDES_BRANCH(Model_Name_str)
        self.Branch = Branch
        self.Memo_str = ''
```

```

#+++++
#START OF TYPE DECLARATION
#Discrete Event Simulator

#+++++
#Initiate Branches
    Memol_str = ''
    Title_str = 'Initiate_DES_Branch:'
    Text_str = DES_Create_Text_Chain_str(
        len(Title_str),
        '='
    )
    Memol_str = Memol_str + Title_str + CRLF
    Memol_str = Memol_str + Text_str + CRLF

    #Branch = TDES_BRANCH(Branch_Name_str)
    Memol_str = Memol_str + 'Name_Of_Branch = ' + Branch.DESBranch_Name_str + CRLF

    Branch.DESBranch_Model_Name_str = 'DES_LabVIEW_Created_Model.py'
    Memol_str = Memol_str + 'Name_Of_Model = ' + Branch.DESBranch_Model_Name_str + CRLF


# +++++
# Name of DES_OBJECT_3 = 'Hungry'
# +++++
    DES_OBJECT_3 = TDES_OBJECT(
        TMACHINE,          #Object_Type
        'Hungry',          #Object_Name_str
        6,                  #Inputs
        6,                  #Outputs
    )

```

```

DES_OBJECT_3.DESObject_InputChannel_Index_Selection_Strategy.Set_Item_str_to('TSelection_Random_Selected_Index')
DES_OBJECT_3.DESObject_InputChannel_Index = 0

DES_OBJECT_3.DESObject_OutputChannel_Index_Selection_Strategy.Set_Item_str_to('TSelection_Random_Selected_Index')
DES_OBJECT_3.DESObject_OutputChannel_Index = 0

DES_OBJECT_3.MACHINE_Minimum_Of_Time = 1.000
DES_OBJECT_3.MACHINE_Usual_Of_Time = 2.000
DES_OBJECT_3.MACHINE_Maximum_Of_Time = 3.000
DES_OBJECT_3.MACHINE_Deviation_Of_Time = 1.000
DES_OBJECT_3.MACHINE_Mean_Of_Time = 1.000
DES_OBJECT_3.MACHINE_Constant_Value_Of_Time = 900.000

DES_OBJECT_3.MACHINE_Distribution.Set_Item_str_to('TDistribution_Constant_Value')
"""
TDES_Distribution =(
    'TDistribution_Constant_Value',          #=0
    'TDistribution_Exponential_Mean',        #=1
    'TDistribution_Normal_Mean_Deviation',   #=2
    'TDistribution_Triangle_Minimum_Usual_Maximum',  #=3
    'TDistribution_Uniform_Minimum_Maximum' #=4
)
"""
DES_OBJECT_3.DESObject_Capacity = 1

# ++++++
# Name of DES_OBJECT_1 = 'Just_awaken'
# ++++++
DES_OBJECT_1 = TDES_OBJECT(
    TSOURCE,          #Object_Type
    'Just_awaken',    #Object_Name_str
    0,                #Inputs
    6,                #Outputs
)

```

```

DES_OBJECT_1.DESObject_OutputChannel_Index_Selection_Strategy.Set_Item_str_to('TSelection_Random_Selected_Index')
DES_OBJECT_1.DESObject_OutputChannel_Index = 0

DES_OBJECT_1.SOURCE_Minimum_Of_Time = 1.000
DES_OBJECT_1.SOURCE_Usual_Of_Time = 2.000
DES_OBJECT_1.SOURCE_Maximum_Of_Time = 3.000
DES_OBJECT_1.SOURCE_Deviation_Of_Time = 1.000
DES_OBJECT_1.SOURCE_Mean_Of_Time = 31.000
DES_OBJECT_1.SOURCE_Constant_Value_Of_Time = 1.000

DES_OBJECT_1.SOURCE_Distribution.Set_Item_str_to('TDistribution_Constant_Value')
"""
TDES_Distribution =(
'TDistribution_Constant_Value',          #=0
'TDistribution_Exponential_Mean',        #=1
'TDistribution_Normal_Mean_Deviation',   #=2
'TDistribution_Triangle_Minimum_Usual_Maximum',  #=3
'TDistribution_Uniform_Minimum_Maximum'  #=4
)
"""
DES_OBJECT_1.SOURCE_Created_Entity.DESEntity_Name_str = 'Person_State'
DES_OBJECT_1.SOURCE_First_Time_of_Entity_Creation = 0.000

DES_OBJECT_1.SOURCE_Maximum_Batch_Size = 1

DES_OBJECT_1.DESObject_Capacity = 1

# ++++++
# Name of DES_OBJECT_4 = 'Sated'
# ++++++
DES_OBJECT_4 = TDES_OBJECT(
    TMACHINE,          #Object_Type
    'Sated',           #Object_Name_str
    6,                 #Inputs
    6,                 #Outputs
)

```

```

DES_OBJECT_4.DESObject_InputChannel_Index_Selection_Strategy.Set_Item_str_to('TSelection_Random_Selected_Index')
DES_OBJECT_4.DESObject_InputChannel_Index = 0

DES_OBJECT_4.DESObject_OutputChannel_Index_Selection_Strategy.Set_Item_str_to('TSelection_Random_Selected_Index')
DES_OBJECT_4.DESObject_OutputChannel_Index = 0

DES_OBJECT_4.MACHINE_Minimum_Of_Time = 1.000
DES_OBJECT_4.MACHINE_Usual_Of_Time = 2.000
DES_OBJECT_4.MACHINE_Maximum_Of_Time = 3.000
DES_OBJECT_4.MACHINE_Deviation_Of_Time = 1.000
DES_OBJECT_4.MACHINE_Mean_Of_Time = 1.000
DES_OBJECT_4.MACHINE_Constant_Value_Of_Time = 18000.000

DES_OBJECT_4.MACHINE_Distribution.Set_Item_str_to('TDistribution_Constant_Value')
"""
TDES_Distribution =(
    'TDistribution_Constant_Value',          #=0
    'TDistribution_Exponential_Mean',        #=1
    'TDistribution_Normal_Mean_Deviation',   #=2
    'TDistribution_Triangle_Minimum_Usual_Maximum',  #=3
    'TDistribution_Uniform_Minimum_Maximum' #=4
)
"""
DES_OBJECT_4.DESObject_Capacity = 1

# ++++++
# Name of DES_OBJECT_5 = 'Sleeping'
# ++++++
DES_OBJECT_5 = TDES_OBJECT(
    TSINK,          #Object_Type
    'Sleeping'      #Object_Name_str
    6,              #Inputs
    0,              #Outputs
)

```

```

# ++++++
# Name of DES_OBJECT_2 = 'Wait'
# ++++++
    DES_OBJECT_2 = TDES_OBJECT(
        'TMACHINE',      #Object_Type
        'Wait',          #Object_Name_str
        6,               #Inputs
        6,               #Outputs
    )

DES_OBJECT_2.DESObject_InputChannel_Index_Selection_Strategy.Set_Item_str_to('TSelection_Random_Selected_Index')
DES_OBJECT_2.DESObject_InputChannel_Index = 0

DES_OBJECT_2.DESObject_OutputChannel_Index_Selection_Strategy.Set_Item_str_to('TSelection_Random_Selected_Index')
DES_OBJECT_2.DESObject_OutputChannel_Index = 0

DES_OBJECT_2.MACHINE_Minimum_Of_Time = 1.000
DES_OBJECT_2.MACHINE_Usual_Of_Time = 2.000
DES_OBJECT_2.MACHINE_Maximum_Of_Time = 3.000
DES_OBJECT_2.MACHINE_Deviation_Of_Time = 1.000
DES_OBJECT_2.MACHINE_Mean_Of_Time = 1.000
DES_OBJECT_2.MACHINE_Constant_Value_Of_Time = 3600.000

DES_OBJECT_2.MACHINE_Distribution.Set_Item_str_to('TDistribution_Constant_Value')
"""
TDES_Distribution =(
    'TDistribution_Constant_Value',      #=0
    'TDistribution_Exponential_Mean',    #=1
    'TDistribution_Normal_Mean_Deviation', #=2
    'TDistribution_Triangle_Minimum_Usual_Maximum', #=3
    'TDistribution_Uniform_Minimum_Maximum' #=4
)
"""
DES_OBJECT_2.DESObject_Capacity = 1

```

```
#+++++  
#Insert of DES_OBJECT into DESObjectList of DES_BRANCH  
    Mem01_str =Mem01_str + CRLF + CRLF  
  
    Title_str ='Insert_DES_Object_Into_DES_ObjectList:'  
    Text_str  =DES_Create_Text_Chain_str(  
        len(Title_str),  
        '='  
    )  
    Mem01_str =Mem01_str + Title_str + CRLF + Text_str + CRLF  
  
#+++++  
  
# &&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&  
# Insert of DES_OBJECTs into DESObjectList of DES_BRANCH  
  
# ++++++  
  
    Branch.DESBranch_Insert_DESObject_Into_DESObjectList ( DES_OBJECT_3)      # Hungry  
    Branch.DESBranch_Insert_DESObject_Into_DESObjectList ( DES_OBJECT_1)      # Just_awaken  
    Branch.DESBranch_Insert_DESObject_Into_DESObjectList ( DES_OBJECT_4)      # Sated  
    Branch.DESBranch_Insert_DESObject_Into_DESObjectList ( DES_OBJECT_5)      # Sleeping  
    Branch.DESBranch_Insert_DESObject_Into_DESObjectList ( DES_OBJECT_2)      # Wait  
# ++++++  
  
#+++++  
#Insert of DES_CONNECTIONS into DESConnectionList of DES_BRANCH  
    Mem01_str =Mem01_str + CRLF + CRLF  
    Title_str ='Insert_DES_Connection_To_DESConnectionList:'
```

```

Text_str =DES_Create_Text_Chain_str(
    len(Title_str),    #unsigned int n,
    '='                #string text
)
Memol_str =Memol_str + Title_str + CRLF + Text_str + CRLF
#+++++

# #####
# Insert of DES_CONNECTIONs into DESConnectionList of DES_BRANCH

# DESBranch_DESConnectionList [0]
# +++++
    DES_Connection = TDES_CONNECTION()
    DES_Connection.DESConnection_DESBranch_Name_OUT_str = Branch.DESBranch_Name_str
    DES_Connection.DESConnection_DESObject_Name_OUT_str = 'Just_awaken'
    DES_Connection.DESConnection_DESObject_Channel_Index_OUT = 0

    DES_Connection.DESConnection_DESBranch_Name_IN_str = Branch.DESBranch_Name_str
    DES_Connection.DESConnection_DESObject_Name_IN_str = 'Wait'
    DES_Connection.DESConnection_DESObject_Channel_Index_IN = 0

    DES_Connection.DESConnection_Enabled_bool = True

    DES_Connection.DESConnection_TRACED_bool = False

    Branch.DESBranch_Insert_Connection_Into_DESConnectionList(DES_Connection,)
# +++++

# DESBranch_DESConnectionList [1]
# +++++
    DES_Connection = TDES_CONNECTION()
    DES_Connection.DESConnection_DESBranch_Name_OUT_str = Branch.DESBranch_Name_str

```



```

DES_Connection.DESConnection_DESObject_Name_OUT_str = 'Wait'
DES_Connection.DESConnection_DESObject_Channel_Index_OUT = 0

DES_Connection.DESConnection_DESBranch_Name_IN_str = Branch.DESBranch_Name_str
DES_Connection.DESConnection_DESObject_Name_IN_str = 'Hungry'
DES_Connection.DESConnection_DESObject_Channel_Index_IN = 0

DES_Connection.DESConnection_Enabled_bool = True

DES_Connection.DESConnection_TRACED_bool = False

Branch.DESBranch_Insert_Connection_Into_DESConnectionList(DES_Connection,)
# ++++++

# DESBranch_DESConnectionList [2]
# ++++++
    DES_Connection = TDES_CONNECTION()
    DES_Connection.DESConnection_DESBranch_Name_OUT_str = Branch.DESBranch_Name_str
    DES_Connection.DESConnection_DESObject_Name_OUT_str = 'Sated'
    DES_Connection.DESConnection_DESObject_Channel_Index_OUT = 1

    DES_Connection.DESConnection_DESBranch_Name_IN_str = Branch.DESBranch_Name_str
    DES_Connection.DESConnection_DESObject_Name_IN_str = 'Hungry'
    DES_Connection.DESConnection_DESObject_Channel_Index_IN = 1

    DES_Connection.DESConnection_Enabled_bool = True

    DES_Connection.DESConnection_TRACED_bool = False

    Branch.DESBranch_Insert_Connection_Into_DESConnectionList(DES_Connection,)
# ++++++

# DESBranch_DESConnectionList [3]
# ++++++
    DES_Connection = TDES_CONNECTION()

```

```

DES_Connection.DESConnection_DESBranch_Name_OUT_str = Branch.DESBranch_Name_str
DES_Connection.DESConnection_DESObject_Name_OUT_str = 'Hungry'
DES_Connection.DESConnection_DESObject_Channel_Index_OUT = 0

DES_Connection.DESConnection_DESBranch_Name_IN_str = Branch.DESBranch_Name_str
DES_Connection.DESConnection_DESObject_Name_IN_str = 'Sated'
DES_Connection.DESConnection_DESObject_Channel_Index_IN = 0

DES_Connection.DESConnection_Enabled_bool = True

DES_Connection.DESConnection_TRACED_bool = False

Branch.DESBranch_Insert_Connection_Into_DESConnectionList(DES_Connection,)
# ++++++

# DESBranch_DESConnectionList [4]
# ++++++
    DES_Connection = TDES_CONNECTION()
    DES_Connection.DESConnection_DESBranch_Name_OUT_str = Branch.DESBranch_Name_str
    DES_Connection.DESConnection_DESObject_Name_OUT_str = 'Sated'
    DES_Connection.DESConnection_DESObject_Channel_Index_OUT = 0

    DES_Connection.DESConnection_DESBranch_Name_IN_str = Branch.DESBranch_Name_str
    DES_Connection.DESConnection_DESObject_Name_IN_str = 'Sleeping'
    DES_Connection.DESConnection_DESObject_Channel_Index_IN = 0

    DES_Connection.DESConnection_Enabled_bool = True

    DES_Connection.DESConnection_TRACED_bool = False

    Branch.DESBranch_Insert_Connection_Into_DESConnectionList(DES_Connection,)
# ++++++

# end of class User_Manual_03_(116)

```

```
# #####
# #####
# #####
# #####
```

5.3.1 DES_Model_03 Python program list (DESBranch_ON_AFTER_ENTITY_ENTERED, DESBranch_ON_AFTER_ENTITY_ENTERED_into_OutputChannel_of_DESObject)

```
#####
#####
# Entity is entered into the DES_OBJECT.
    def DESBranch_ON_AFTER_ENTITY_ENTERED_into_DESObject(
        self,
        DES_Object,      # TDES_OBJECT,
        Entity,          # TDES_ENTITY,

        # Python Output:
        # return [Memo_str]
    ):
        """
Ez az eljárás minden egyes DES_Object-nél végrehajtódik,
ha az Entitás éppen belépett a DES_Object-be.
        """

        Memo_str = ''

#####
#####

        if ((self.DESBranch_Name_str == 'UM_Model_03')
            and (DES_Object.DESObject_Name_str == 'Sated')):

            Entity.DESEntity_SELF_MANAGED_bool =True

#####
#####

        return [Memo_str]
```

```

#end of def DESBranch_ON_AFTER_ENTITY_ENTERED_into_DESObject
#-----

#####
#####
# Entity is exited from the DES_OBJECT.
# It is staying in Output Channel of DES_OBJECT.
    def DESBranch_ON_AFTER_ENTITY_ENTERED_into_OutputChannel_of_DESObject(
        self,
        DES_Object,      # TDES_OBJECT,
        Entity,          # TDES_ENTITY,

        # Python Output:
        # return [Memo_str]
    ):
        """
Ez az eljárás minden egyes DES_Object-nél végrehajtódik,
ha az Entitás már kilépett a DES_Object-ből és már belépett a DES_Object
egyik kimeneti csatornájába.

Az eljárás régebbi elnevezése: ON_AFTER_ENTITY_EXITED_from_DESObject
"""

        Memo_str = ''

#####
#####

        if ((self.DESBranch_Name_str == 'UM_Model_03')
            and (DES_Object.DESObject_Name_str == 'Sated')):

            Entity.DESEntity_SELF_MANAGED_bool =False

#####
#####

```

```
else:
```

```
DES_Object.DESObject_OutputChannel_Index = 0
```

[illegible]

```
return [Memo_str]
```

```
#end of def DESBranch_ON_ENTITY_SELF_MANAGED_OutputChannel_Index_Setting
```

##-----

5.3.2 DES_Modell_03 TDES_OBJECT list

Local time :Fri Oct 23 08:24:56 2020
 Model_Name : UM_Model_03

UM_Model_03.Print ObjectList Short:

=====

Number of DESObjects = 5
 GTime_Now [DDD:HH:MM:SS.XXX] = 1:03:15:00.000

=====

=====

UM_Model_03.DESObjectList[i]	DESObject_Name	DESObject_Type	State	Last_Calculation_Time

DESObject_Content

=====

=====

UM_Model_03.DESObjectList[0]	Hungry	TMACHINE	TIdle	0:22:15:00.000
>x,x,x,x,x,x>-[x]->x,x,x,x,x,x>	(Capacity = 1)			
UM_Model_03.DESObjectList[1]	Just_awaken	TSOURCE	TIdle	0:00:00:01.000
>nil>-[x]->x,x,x,x,x,x>	(Capacity = 1)			
UM_Model_03.DESObjectList[2]	Sated	TMACHINE	TIdle	1:03:15:00.000
>x,x,x,x,x,x>-[x]->x,x,x,x,x,x>	(Capacity = 1)			
UM_Model_03.DESObjectList[3]	Sleeping	TSINK	TIdle	1:03:15:00.000
>x,x,x,x,x,x>-[x]->nil>				
UM_Model_03.DESObjectList[4]	Wait	TMACHINE	TIdle	0:01:00:00.000
>x,x,x,x,x,x>-[x]->x,x,x,x,x,x>	(Capacity = 1)			

=====

UM_Model_03.Print_DESObjectList:

=====

Number of DESObjects = 5

GTime_Now [DDD:HH:MM:SS.XXX] = 1:03:15:00.000

#####

UM_Model_03.DESBranch_DESObjectList[0]

TMACHINE_start_TMACHINE_start_TMACHINE_start_TMACHINE_start_TMACHINE_start_TMACH
+++++

UM_Model_03.Hungry.MACHINE_Time_Of_Next_Launching = 0:22:15:00.000
UM_Model_03.Hungry.MACHINE_Time_Step = 0:00:15:00.000

UM_Model_03.Hungry.MACHINE_Distribution =TDistribution_Constant_Value

UM_Model_03.Hungry.MACHINE_Constant_Value_Of_Time = 0:00:15:00.000
UM_Model_03.Hungry.MACHINE_Mean_Of_Time = 0:00:00:01.000
UM_Model_03.Hungry.MACHINE_Deviation_Of_Time = 0:00:00:01.000
UM_Model_03.Hungry.MACHINE_Maximum_Of_Time = 0:00:00:03.000
UM_Model_03.Hungry.MACHINE_Usual_Of_Time = 0:00:00:02.000
UM_Model_03.Hungry.MACHINE_Minimum_Of_Time = 0:00:00:01.000

UM_Model_03.Hungry.MACHINE_Utilization =77.982 [%]

UM_Model_03.Hungry.MACHINE_Last_Calculation_Time = 0:22:15:00.000
.....

UM_Model_03.Hungry.DESObject_Owner_class =<TDES_BRANCH.TDES_BRANCH object at 0x00000214A0A510D0> (UM_Model_03)

UM_Model_03.Hungry.DESObject_Name_str =Hungry
UM_Model_03.Hungry.DESObject_ID_Number =12
UM_Model_03.Hungry.DESObject_Type =TMACHINE

UM_Model_03.Hungry.DESObject_Priority_To_DESEntity_From_DESObject =0
UM_Model_03.Hungry.DESBranch_Name_str =UM_Model_03

```

UM_Model_03.Hungry.DESObject_Commanded_State_In_Previous_Step =TCommanded_Enabled_State
UM_Model_03.Hungry.DESObject_Commanded_State =TCommanded_Enabled_State

UM_Model_03.Hungry.DESObject_Work_State =TIdle
UM_Model_03.Hungry.DESObject_Work_State_In_Previous_Step =TIdle
UM_Model_03.Hungry.DESObject_Work_State_Before_Fail_Or_Pause =TIdle

UM_Model_03.Hungry.Time_Percent_In_Statuses[  TIdle] = 22.018
UM_Model_03.Hungry.Time_Percent_In_Statuses[  TBusy] = 77.982
UM_Model_03.Hungry.Time_Percent_In_Statuses[TBlocked] = 0.000
UM_Model_03.Hungry.Time_Percent_In_Statuses[ TFailed] = 0.000
UM_Model_03.Hungry.Time_Percent_In_Statuses[ TPaused] = 0.000

UM_Model_03.Hungry.System_Attributes[  i] = Name
Value
UM_Model_03.Hungry.System_Attributes[  0] = WORKED_Entity_Sample_Number
UM_Model_03.Hungry.System_Attributes[  1] = WORKED_Entity_Sample_Summa
4500.0
UM_Model_03.Hungry.System_Attributes[  2] = WORKED_Entity_Average_Staying_Time_in_DESObject
0:00:15:00.000
UM_Model_03.Hungry.System_Attributes[  3] = WORKED_Entity_Through_Output_Rate at Output_Channel[0]
0.0000499 [entity/seconds]
UM_Model_03.Hungry.System_Attributes[  4] = WORKED_Entity_Produce_Time at Output_Channel[0]
20025.0000000 [seconds/entity]

UM_Model_03.Hungry.First_Calculation? =False

UM_Model_03.Hungry.InputChannel_Index_Selection_Strategy =TSelection_Random_Selected_Index
UM_Model_03.Hungry.InputChannel_Index =0

UM_Model_03.Hungry.Number_Of_InputChannels =6

UM_Model_03.Hungry.Input [ 0].Data =#Empty
UM_Model_03.Hungry.Input [ 0].Channel_Is_Enabled =True
UM_Model_03.Hungry.Input [ 0].Channel_Is_Connected =True    (#_of_Entities= 1)

UM_Model_03.Hungry.Input [ 1].Data =#Empty
UM_Model_03.Hungry.Input [ 1].Channel_Is_Enabled =True

```

```

UM_Model_03.Hungry.Input [ 1].Channel_Is_Connected =True    (#_of_Entities= 4)

UM_Model_03.Hungry.Input [ 2].Data =#Empty
UM_Model_03.Hungry.Input [ 2].Channel_Is_Enabled =True
UM_Model_03.Hungry.Input [ 2].Channel_Is_Connected =False    (#_of_Entities= 0)

UM_Model_03.Hungry.Input [ 3].Data =#Empty
UM_Model_03.Hungry.Input [ 3].Channel_Is_Enabled =True
UM_Model_03.Hungry.Input [ 3].Channel_Is_Connected =False    (#_of_Entities= 0)

UM_Model_03.Hungry.Input [ 4].Data =#Empty
UM_Model_03.Hungry.Input [ 4].Channel_Is_Enabled =True
UM_Model_03.Hungry.Input [ 4].Channel_Is_Connected =False    (#_of_Entities= 0)

UM_Model_03.Hungry.Input [ 5].Data =#Empty
UM_Model_03.Hungry.Input [ 5].Channel_Is_Enabled =True
UM_Model_03.Hungry.Input [ 5].Channel_Is_Connected =False    (#_of_Entities= 0)

UM_Model_03.Hungry.Capacity =1
UM_Model_03.Hungry.Number_Of_Content_Entities =0

UM_Model_03.Hungry.OutputChannel_Index_Selection_Strategy =TSelection_Random_Selected_Index
UM_Model_03.Hungry.OutputChannel_Index =0

UM_Model_03.Hungry.Number_Of_OutputChannels =6

UM_Model_03.Hungry.Output [ 0].Data =#Empty
UM_Model_03.Hungry.Output [ 0].Channel_Is_Enabled =True
UM_Model_03.Hungry.Output [ 0].Channel_Is_Connected =True    (#_of_Entities= 5)

UM_Model_03.Hungry.Output [ 1].Data =#Empty
UM_Model_03.Hungry.Output [ 1].Channel_Is_Enabled =True
UM_Model_03.Hungry.Output [ 1].Channel_Is_Connected =False    (#_of_Entities= 0)

UM_Model_03.Hungry.Output [ 2].Data =#Empty
UM_Model_03.Hungry.Output [ 2].Channel_Is_Enabled =True
UM_Model_03.Hungry.Output [ 2].Channel_Is_Connected =False    (#_of_Entities= 0)

UM_Model_03.Hungry.Output [ 3].Data =#Empty

```

```
UM_Model_03.Hungry.Output [ 3].Channel_Is_Enabled =True
UM_Model_03.Hungry.Output [ 3].Channel_Is_Connected =False    (#_of_Entities= 0)
```

```
UM_Model_03.Hungry.Output [ 4].Data =#Empty
UM_Model_03.Hungry.Output [ 4].Channel_Is_Enabled =True
UM_Model_03.Hungry.Output [ 4].Channel_Is_Connected =False    (#_of_Entities= 0)
```

```
UM_Model_03.Hungry.Output [ 5].Data =#Empty
UM_Model_03.Hungry.Output [ 5].Channel_Is_Enabled =True
UM_Model_03.Hungry.Output [ 5].Channel_Is_Connected =False    (#_of_Entities= 0)
```

```
*****
TMACHINE_end_TMACHINE_end_TMACHINE_end_TMACHINE_end_TMACHINE_end_TMACHINE_end_
-----
```

```
#####
#####
UM_Model_03.DESBranch_DESObjectList[    1]
```

```
*****
TSOURCE_start_TSOURCE_start_TSOURCE_start_TSOURCE_start_TSOURCE_start_TSOURCE_
+++++
```

```
UM_Model_03.Just_awaken.SOURCE_Created_Entity.Name_str =Person_State
```

```
UM_Model_03.Just_awaken.SOURCE_Time_Of_Next_Launching =  0:00:00:01.000
UM_Model_03.Just_awaken.SOURCE_Time_Step =  0:00:00:01.000
```

```
UM_Model_03.Just_awaken.SOURCE_Distribution =TDistribution_Constant_Value
```

```
UM_Model_03.Just_awaken.SOURCE_Constant_Value_Of_Time =  0:00:00:01.000
UM_Model_03.Just_awaken.SOURCE_Mean_Of_Time =  0:00:00:31.000
UM_Model_03.Just_awaken.SOURCE_Deviation_Of_Time =  0:00:00:01.000
UM_Model_03.Just_awaken.SOURCE_Maximum_Of_Time =  0:00:00:03.000
UM_Model_03.Just_awaken.SOURCE_Usual_Of_Time =  0:00:00:02.000
UM_Model_03.Just_awaken.SOURCE_Minimum_Of_Time =  0:00:00:01.000
```

```

UM_Model_03.Just_awaken.SOURCE_Maximum_Batch_Size =1
UM_Model_03.Just_awaken.SOURCE_Number_Of_Created_Objects =1

UM_Model_03.Just_awaken.SOURCE_Last_Calculation_Time = 0:00:00:01.000
.....

UM_Model_03.Just_awaken.DESObject_Owner_class =<TDES_BRANCH.TDES_BRANCH object at 0x00000214A0A510D0>
(UM_Model_03)

UM_Model_03.Just_awaken.DESObject_Name_str =Just_awaken
UM_Model_03.Just_awaken.DESObject_ID_Number =13
UM_Model_03.Just_awaken.DESObject_Type =TSOURCE

UM_Model_03.Just_awaken.DESObject_Priority_To_DESEntity_From_DESObject =0
UM_Model_03.Just_awaken.DESBranch_Name_str =UM_Model_03

UM_Model_03.Just_awaken.DESObject_Commanded_State_In_Previous_Step =TCommanded_Enabled_State
UM_Model_03.Just_awaken.DESObject_Commanded_State =TCommanded_Enabled_State

UM_Model_03.Just_awaken.DESObject_Work_State =TIdle
UM_Model_03.Just_awaken.DESObject_Work_State_In_Previous_Step =TIdle
UM_Model_03.Just_awaken.DESObject_Work_State_Before_Fail_Or_Pause =TIdle

UM_Model_03.Just_awaken.Time_Percent_In_Statuses[ TIdle] =100.000
UM_Model_03.Just_awaken.Time_Percent_In_Statuses[ TBusy] = 0.000
UM_Model_03.Just_awaken.Time_Percent_In_Statuses[TBlocked] = 0.000
UM_Model_03.Just_awaken.Time_Percent_In_Statuses[ TFailed] = 0.000
UM_Model_03.Just_awaken.Time_Percent_In_Statuses[ TPaused] = 0.000

UM_Model_03.Just_awaken.System_Attributes[ i] = Name
Value
UM_Model_03.Just_awaken.System_Attributes[ 0] = WORKED_Entity_Sample_Number
1
UM_Model_03.Just_awaken.System_Attributes[ 1] = WORKED_Entity_Sample_Summa
0.0
UM_Model_03.Just_awaken.System_Attributes[ 2] = WORKED_Entity_Average_Staying_Time_in_DESObject
0:00:00:00.000

```

```
UM_Model_03.Just_awaken.First_Calculation? =False
```

```
UM_Model_03.Just_awaken.Capacity =1
```

```
UM_Model_03.Just_awaken.Number_Of_Content_Entities =0
```

```
UM_Model_03.Just_awaken.OutputChannel_Index_Selection_Strategy =TSelection_Random_Selected_Index
```

```
UM_Model_03.Just_awaken.OutputChannel_Index =0
```

```
UM_Model_03.Just_awaken.Number_Of_OutputChannels =6
```

```
UM_Model_03.Just_awaken.Output [ 0].Data =#Empty
```

```
UM_Model_03.Just_awaken.Output [ 0].Channel_Is_Enabled =True
```

```
UM_Model_03.Just_awaken.Output [ 0].Channel_Is_Connected =True      (#_of_Entities= 1)
```

```
UM_Model_03.Just_awaken.Output [ 1].Data =#Empty
```

```
UM_Model_03.Just_awaken.Output [ 1].Channel_Is_Enabled =True
```

```
UM_Model_03.Just_awaken.Output [ 1].Channel_Is_Connected =False    (#_of_Entities= 0)
```

```
UM_Model_03.Just_awaken.Output [ 2].Data =#Empty
```

```
UM_Model_03.Just_awaken.Output [ 2].Channel_Is_Enabled =True
```

```
UM_Model_03.Just_awaken.Output [ 2].Channel_Is_Connected =False    (#_of_Entities= 0)
```

```
UM_Model_03.Just_awaken.Output [ 3].Data =#Empty
```

```
UM_Model_03.Just_awaken.Output [ 3].Channel_Is_Enabled =True
```

```
UM_Model_03.Just_awaken.Output [ 3].Channel_Is_Connected =False    (#_of_Entities= 0)
```

```
UM_Model_03.Just_awaken.Output [ 4].Data =#Empty
```

```
UM_Model_03.Just_awaken.Output [ 4].Channel_Is_Enabled =True
```

```
UM_Model_03.Just_awaken.Output [ 4].Channel_Is_Connected =False    (#_of_Entities= 0)
```

```
UM_Model_03.Just_awaken.Output [ 5].Data =#Empty
```

```
UM_Model_03.Just_awaken.Output [ 5].Channel_Is_Enabled =True
```

```
UM_Model_03.Just_awaken.Output [ 5].Channel_Is_Connected =False    (#_of_Entities= 0)
```

```
*****
```

```
TSOURCE_end_TSOURCE_end_TSOURCE_end_TSOURCE_end_TSOURCE_end_TSOURCE_end_TSOURCE_
```

```
-----
```

```
#####
#####
UM_Model_03.DESBranch_DESObjectList[    2]

*****
TMACHINE_start_TMACHINE_start_TMACHINE_start_TMACHINE_start_TMACHINE_start_TMACH
+++++++

UM_Model_03.Sated.MACHINE_Time_Of_Next_Launching =  1:03:15:00.000
UM_Model_03.Sated.MACHINE_Time_Step =  0:05:00:00.000

UM_Model_03.Sated.MACHINE_Distribution =TDistribution_Constant_Value

UM_Model_03.Sated.MACHINE_Constant_Value_Of_Time =  0:05:00:00.000
UM_Model_03.Sated.MACHINE_Mean_Of_Time =  0:00:00:01.000
UM_Model_03.Sated.MACHINE_Deviation_Of_Time =  0:00:00:01.000
UM_Model_03.Sated.MACHINE_Maximum_Of_Time =  0:00:00:03.000
UM_Model_03.Sated.MACHINE_Usual_Of_Time =  0:00:00:02.000
UM_Model_03.Sated.MACHINE_Minimum_Of_Time =  0:00:00:01.000

UM_Model_03.Sated.MACHINE_Utilization =95.413 [%]

UM_Model_03.Sated.MACHINE_Last_Calculation_Time =  1:03:15:00.000
.....

UM_Model_03.Sated.DESObject_Owner_class =<TDES_BRANCH.TDES_BRANCH object at 0x00000214A0A510D0>    (UM_Model_03)

UM_Model_03.Sated.DESObject_Name_str =Sated
UM_Model_03.Sated.DESObject_ID_Number =15
UM_Model_03.Sated.DESObject_Type =TMACHINE

UM_Model_03.Sated.DESObject_Priority_To_DESEntity_From_DESObject =0
UM_Model_03.Sated.DESBranch_Name_str =UM_Model_03
```

```
UM_Model_03.Sated.DESObject_Commanded_State_In_Previous_Step =TCommanded_Enabled_State
UM_Model_03.Sated.DESObject_Commanded_State =TCommanded_Enabled_State
```

```
UM_Model_03.Sated.DESObject_Work_State =TIdle
UM_Model_03.Sated.DESObject_Work_State_In_Previous_Step =TIdle
UM_Model_03.Sated.DESObject_Work_State_Before_Fail_Or_Pause =TIdle
```

```
UM_Model_03.Sated.Time_Percent_In_Statuses[ TIdle] = 4.587
UM_Model_03.Sated.Time_Percent_In_Statuses[ TBusy] = 95.413
UM_Model_03.Sated.Time_Percent_In_Statuses[TBlocked] = 0.000
UM_Model_03.Sated.Time_Percent_In_Statuses[ TFailed] = 0.000
UM_Model_03.Sated.Time_Percent_In_Statuses[ TPaused] = 0.000
```

		Value
UM_Model_03.Sated.System_Attributes[i]	= Name	
UM_Model_03.Sated.System_Attributes[0]	= WORKED_Entity_Sample_Number	5
UM_Model_03.Sated.System_Attributes[1]	= WORKED_Entity_Sample_Summa	
90000.0		
UM_Model_03.Sated.System_Attributes[2]	= WORKED_Entity_Average_Staying_Time_in_DESObject	
0:05:00:00.000		
UM_Model_03.Sated.System_Attributes[3]	= WORKED_Entity_Through_Output_Rate at Output_Channel[1]	
0.0000408 [entity/seconds]		
UM_Model_03.Sated.System_Attributes[4]	= WORKED_Entity_Produce_Time at Output_Channel[1]	
24525.0000000 [seconds/entity]		

```
UM_Model_03.Sated.First_Calculation? =False
```

```
UM_Model_03.Sated.InputChannel_Index_Selection_Strategy =TSelection_Random_Selected_Index
UM_Model_03.Sated.InputChannel_Index =0
```

```
UM_Model_03.Sated.Number_Of_InputChannels =6
```

```
UM_Model_03.Sated.Input [ 0].Data =#Empty
UM_Model_03.Sated.Input [ 0].Channel_Is_Enabled =True
UM_Model_03.Sated.Input [ 0].Channel_Is_Connected =True (#_of_Entities= 5)
```

```
UM_Model_03.Sated.Input [ 1].Data =#Empty
UM_Model_03.Sated.Input [ 1].Channel_Is_Enabled =True
UM_Model_03.Sated.Input [ 1].Channel_Is_Connected =False (#_of_Entities= 0)
```



```
UM_Model_03.Sated.Input [ 2].Data =#Empty
UM_Model_03.Sated.Input [ 2].Channel_Is_Enabled =True
UM_Model_03.Sated.Input [ 2].Channel_Is_Connected =False    (#_of_Entities= 0)

UM_Model_03.Sated.Input [ 3].Data =#Empty
UM_Model_03.Sated.Input [ 3].Channel_Is_Enabled =True
UM_Model_03.Sated.Input [ 3].Channel_Is_Connected =False    (#_of_Entities= 0)

UM_Model_03.Sated.Input [ 4].Data =#Empty
UM_Model_03.Sated.Input [ 4].Channel_Is_Enabled =True
UM_Model_03.Sated.Input [ 4].Channel_Is_Connected =False    (#_of_Entities= 0)

UM_Model_03.Sated.Input [ 5].Data =#Empty
UM_Model_03.Sated.Input [ 5].Channel_Is_Enabled =True
UM_Model_03.Sated.Input [ 5].Channel_Is_Connected =False    (#_of_Entities= 0)

UM_Model_03.Sated.Capacity =1
UM_Model_03.Sated.Number_Of_Content_Entities =0

UM_Model_03.Sated.OutputChannel_Index_Selection_Strategy =TSelection_Random_Selected_Index
UM_Model_03.Sated.OutputChannel_Index =0

UM_Model_03.Sated.Number_Of_OutputChannels =6

UM_Model_03.Sated.Output [ 0].Data =#Empty
UM_Model_03.Sated.Output [ 0].Channel_Is_Enabled =True
UM_Model_03.Sated.Output [ 0].Channel_Is_Connected =True    (#_of_Entities= 1)

UM_Model_03.Sated.Output [ 1].Data =#Empty
UM_Model_03.Sated.Output [ 1].Channel_Is_Enabled =True
UM_Model_03.Sated.Output [ 1].Channel_Is_Connected =True    (#_of_Entities= 4)

UM_Model_03.Sated.Output [ 2].Data =#Empty
UM_Model_03.Sated.Output [ 2].Channel_Is_Enabled =True
UM_Model_03.Sated.Output [ 2].Channel_Is_Connected =False    (#_of_Entities= 0)

UM_Model_03.Sated.Output [ 3].Data =#Empty
UM_Model_03.Sated.Output [ 3].Channel_Is_Enabled =True
```

```
UM_Model_03.Sated.Output [ 3].Channel_Is_Connected =False    (#_of_Entities= 0)
```

```
UM_Model_03.Sated.Output [ 4].Data =#Empty
```

```
UM_Model_03.Sated.Output [ 4].Channel_Is_Enabled =True
```

```
UM_Model_03.Sated.Output [ 4].Channel_Is_Connected =False    (#_of_Entities= 0)
```

```
UM_Model_03.Sated.Output [ 5].Data =#Empty
```

```
UM_Model_03.Sated.Output [ 5].Channel_Is_Enabled =True
```

```
UM_Model_03.Sated.Output [ 5].Channel_Is_Connected =False    (#_of_Entities= 0)
```

```
*****
```

```
TMACHINE_end_TMACHINE_end_TMACHINE_end_TMACHINE_end_TMACHINE_end_TMACHINE_end_
```

```
-----
```

```
#####
```

```
#####
```

```
UM_Model_03.DESBranch_DESObjectList[    3]
```

```
*****
```

```
TSINK_start_TSINK_start_TSINK_start_TSINK_start_TSINK_start_TSINK_start_TSINK_
```

```
+++++
```

```
UM_Model_03.Sleeping.SINK_Last_Content_Entity_ID_Number =#0
```

```
UM_Model_03.Sleeping.SINK_NumberOfSinkedObjects =1
```

```
UM_Model_03.Sleeping.SINK_Last_Calculation_Time =  1:03:15:00.000
```

```
.....
```

```
UM_Model_03.Sleeping.DESObject_Owner_class =<TDES_BRANCH.TDES_BRANCH object at 0x00000214A0A510D0>
```

```
(UM_Model_03)
```

```
UM_Model_03.Sleeping.DESObject_Name_str =Sleeping
```

```
UM_Model_03.Sleeping.DESObject_ID_Number =16
```

```
UM_Model_03.Sleeping.DESObject_Type =TSINK
```

```

UM_Model_03.Sleeping.DESObject_Priority_To_DESEntity_From_DESObject =0
UM_Model_03.Sleeping.DESBranch_Name_str =UM_Model_03

UM_Model_03.Sleeping.DESObject_Commanded_State_In_Previous_Step =TCommanded_Enabled_State
UM_Model_03.Sleeping.DESObject_Commanded_State =TCommanded_Enabled_State

UM_Model_03.Sleeping.DESObject_Work_State =TIdle
UM_Model_03.Sleeping.DESObject_Work_State_In_Previous_Step =TIdle
UM_Model_03.Sleeping.DESObject_Work_State_Before_Fail_Or_Pause =TIdle

UM_Model_03.Sleeping.Time_Percent_In_Statuses[ TIdle] =100.000
UM_Model_03.Sleeping.Time_Percent_In_Statuses[ TBusy] = 0.000
UM_Model_03.Sleeping.Time_Percent_In_Statuses[TBlocked] = 0.000
UM_Model_03.Sleeping.Time_Percent_In_Statuses[ TFailed] = 0.000
UM_Model_03.Sleeping.Time_Percent_In_Statuses[ TPaused] = 0.000

UM_Model_03.Sleeping.System_Attributes[ i] = Name
Value
UM_Model_03.Sleeping.System_Attributes[ 0] = WORKED_Entity_Sample_Number
UM_Model_03.Sleeping.System_Attributes[ 1] = WORKED_Entity_Sample_Summa
0.0
UM_Model_03.Sleeping.System_Attributes[ 2] = WORKED_Entity_Average_Staying_Time_in_DESObject
0:00:00:00.000

UM_Model_03.Sleeping.First_Calculation? =False

UM_Model_03.Sleeping.InputChannel_Index_Selection_Strategy =TSelection_Random_Selected_Index
UM_Model_03.Sleeping.InputChannel_Index =0

UM_Model_03.Sleeping.Number_Of_InputChannels =6

UM_Model_03.Sleeping.Input [ 0].Data =#Empty
UM_Model_03.Sleeping.Input [ 0].Channel_Is_Enabled =True
UM_Model_03.Sleeping.Input [ 0].Channel_Is_Connected =True (#_of_Entities= 1)

UM_Model_03.Sleeping.Input [ 1].Data =#Empty
UM_Model_03.Sleeping.Input [ 1].Channel_Is_Enabled =True
UM_Model_03.Sleeping.Input [ 1].Channel_Is_Connected =False (#_of_Entities= 0)

```

```
UM_Model_03.Sleeping.Input [ 2].Data =#Empty
UM_Model_03.Sleeping.Input [ 2].Channel_Is_Enabled =True
UM_Model_03.Sleeping.Input [ 2].Channel_Is_Connected =False    (#_of_Entities= 0)
```

```
UM_Model_03.Sleeping.Input [ 3].Data =#Empty
UM_Model_03.Sleeping.Input [ 3].Channel_Is_Enabled =True
UM_Model_03.Sleeping.Input [ 3].Channel_Is_Connected =False    (#_of_Entities= 0)
```

```
UM_Model_03.Sleeping.Input [ 4].Data =#Empty
UM_Model_03.Sleeping.Input [ 4].Channel_Is_Enabled =True
UM_Model_03.Sleeping.Input [ 4].Channel_Is_Connected =False    (#_of_Entities= 0)
```

```
UM_Model_03.Sleeping.Input [ 5].Data =#Empty
UM_Model_03.Sleeping.Input [ 5].Channel_Is_Enabled =True
UM_Model_03.Sleeping.Input [ 5].Channel_Is_Connected =False    (#_of_Entities= 0)
```

```
UM_Model_03.Sleeping.Capacity =1
UM_Model_03.Sleeping.Number_Of_Content_Entities =0
```

```
*****
TSINK_end_TSINK_end_TSINK_end_TSINK_end_TSINK_end_TSINK_end_TSINK_end_TSINK_end_
-----
```

```
#####
#####
UM_Model_03.DESBranch_DESObjectList[    4]
```

```
*****
TMACHINE_start_TMACHINE_start_TMACHINE_start_TMACHINE_start_TMACHINE_start_TMACH
+++++
```

```
UM_Model_03.Wait.MACHINE_Time_Of_Next_Launching =  0:01:00:00.000
UM_Model_03.Wait.MACHINE_Time_Step =  0:01:00:00.000
```

```
UM_Model_03.Wait.MACHINE_Distribution =TDistribution_Constant_Value
```

```

UM_Model_03.Wait.MACHINE_Constant_Value_Of_Time = 0:01:00:00.000
UM_Model_03.Wait.MACHINE_Mean_Of_Time = 0:00:00:01.000
UM_Model_03.Wait.MACHINE_Deviation_Of_Time = 0:00:00:01.000
UM_Model_03.Wait.MACHINE_Maximum_Of_Time = 0:00:00:03.000
UM_Model_03.Wait.MACHINE_Usual_Of_Time = 0:00:00:02.000
UM_Model_03.Wait.MACHINE_Minimum_Of_Time = 0:00:00:01.000

UM_Model_03.Wait.MACHINE_Utilization = 3.670 [%]

UM_Model_03.Wait.MACHINE_Last_Calculation_Time = 0:01:00:00.000
.....

UM_Model_03.Wait.DESObject_Owner_class =<TDES_BRANCH.TDES_BRANCH object at 0x00000214A0A510D0> (UM_Model_03)

UM_Model_03.Wait.DESObject_Name_str =Wait
UM_Model_03.Wait.DESObject_ID_Number =17
UM_Model_03.Wait.DESObject_Type =TMACHINE

UM_Model_03.Wait.DESObject_Priority_To_DESEntity_From_DESObject =0
UM_Model_03.Wait.DESBranch_Name_str =UM_Model_03

UM_Model_03.Wait.DESObject_Commanded_State_In_Previous_Step =TCommanded_Enabled_State
UM_Model_03.Wait.DESObject_Commanded_State =TCommanded_Enabled_State

UM_Model_03.Wait.DESObject_Work_State =TIdle
UM_Model_03.Wait.DESObject_Work_State_In_Previous_Step =TIdle
UM_Model_03.Wait.DESObject_Work_State_Before_Fail_Or_Pause =TIdle

UM_Model_03.Wait.Time_Percent_In_Statuses[ TIdle] = 96.330
UM_Model_03.Wait.Time_Percent_In_Statuses[ TBusy] = 3.670
UM_Model_03.Wait.Time_Percent_In_Statuses[TBlocked] = 0.000
UM_Model_03.Wait.Time_Percent_In_Statuses[ TFailed] = 0.000
UM_Model_03.Wait.Time_Percent_In_Statuses[ TPaused] = 0.000

UM_Model_03.Wait.System_Attributes[ i] = Name
UM_Model_03.Wait.System_Attributes[ 0] = WORKED_Entity_Sample_Number
UM_Model_03.Wait.System_Attributes[ 1] = WORKED_Entity_Sample_Summa

```

	Value
UM_Model_03.Wait.System_Attributes[0] = WORKED_Entity_Sample_Number	1
UM_Model_03.Wait.System_Attributes[1] = WORKED_Entity_Sample_Summa	3600.0

```
UM_Model_03.Wait.System_Attributes[ 2] = WORKED_Entity_Average_Staying_Time_in_DESObject  
0:01:00:00.000
```

```
UM_Model_03.Wait.First_Calculation? =False
```

```
UM_Model_03.Wait.InputChannel_Index_Selection_Strategy =TSelection_Random_Selected_Index  
UM_Model_03.Wait.InputChannel_Index =0
```

```
UM_Model_03.Wait.Number_Of_InputChannels =6
```

```
UM_Model_03.Wait.Input [ 0].Data =#Empty  
UM_Model_03.Wait.Input [ 0].Channel_Is_Enabled =True  
UM_Model_03.Wait.Input [ 0].Channel_Is_Connected =True    (#_of_Entities= 1)
```

```
UM_Model_03.Wait.Input [ 1].Data =#Empty  
UM_Model_03.Wait.Input [ 1].Channel_Is_Enabled =True  
UM_Model_03.Wait.Input [ 1].Channel_Is_Connected =False    (#_of_Entities= 0)
```

```
UM_Model_03.Wait.Input [ 2].Data =#Empty  
UM_Model_03.Wait.Input [ 2].Channel_Is_Enabled =True  
UM_Model_03.Wait.Input [ 2].Channel_Is_Connected =False    (#_of_Entities= 0)
```

```
UM_Model_03.Wait.Input [ 3].Data =#Empty  
UM_Model_03.Wait.Input [ 3].Channel_Is_Enabled =True  
UM_Model_03.Wait.Input [ 3].Channel_Is_Connected =False    (#_of_Entities= 0)
```

```
UM_Model_03.Wait.Input [ 4].Data =#Empty  
UM_Model_03.Wait.Input [ 4].Channel_Is_Enabled =True  
UM_Model_03.Wait.Input [ 4].Channel_Is_Connected =False    (#_of_Entities= 0)
```

```
UM_Model_03.Wait.Input [ 5].Data =#Empty  
UM_Model_03.Wait.Input [ 5].Channel_Is_Enabled =True  
UM_Model_03.Wait.Input [ 5].Channel_Is_Connected =False    (#_of_Entities= 0)
```

```
UM_Model_03.Wait.Capacity =1  
UM_Model_03.Wait.Number_Of_Content_Entities =0
```

```
UM_Model_03.Wait.OutputChannel_Index_Selection_Strategy =TSelection_Random_Selected_Index
```

```

UM_Model_03.Wait.OutputChannel_Index =0

UM_Model_03.Wait.Number_Of_OutputChannels =6

UM_Model_03.Wait.Output [ 0].Data =#Empty
UM_Model_03.Wait.Output [ 0].Channel_Is_Enabled =True
UM_Model_03.Wait.Output [ 0].Channel_Is_Connected =True      (#_of_Entities= 1)

UM_Model_03.Wait.Output [ 1].Data =#Empty
UM_Model_03.Wait.Output [ 1].Channel_Is_Enabled =True
UM_Model_03.Wait.Output [ 1].Channel_Is_Connected =False     (#_of_Entities= 0)

UM_Model_03.Wait.Output [ 2].Data =#Empty
UM_Model_03.Wait.Output [ 2].Channel_Is_Enabled =True
UM_Model_03.Wait.Output [ 2].Channel_Is_Connected =False     (#_of_Entities= 0)

UM_Model_03.Wait.Output [ 3].Data =#Empty
UM_Model_03.Wait.Output [ 3].Channel_Is_Enabled =True
UM_Model_03.Wait.Output [ 3].Channel_Is_Connected =False     (#_of_Entities= 0)

UM_Model_03.Wait.Output [ 4].Data =#Empty
UM_Model_03.Wait.Output [ 4].Channel_Is_Enabled =True
UM_Model_03.Wait.Output [ 4].Channel_Is_Connected =False     (#_of_Entities= 0)

UM_Model_03.Wait.Output [ 5].Data =#Empty
UM_Model_03.Wait.Output [ 5].Channel_Is_Enabled =True
UM_Model_03.Wait.Output [ 5].Channel_Is_Connected =False     (#_of_Entities= 0)

*****
TMACHINE_end_TMACHINE_end_TMACHINE_end_TMACHINE_end_TMACHINE_end_TMACHINE_end_
-----

End of "UM_Model_03.Print_DESObjectList"

```

5.3.3 DES_Modell_03 TDES_ENTITY list

```
Local time :Fri Oct 23 08:24:56 2020
Model_Name : UM_Model_03
```

```
UM_Model_03.Print_DESEntityList_Short: (ENTITYLIST Result)
```

```
=====
```

```
Number of Entities = 0
```

```
GTime_Now [DDD:HH:MM:SS.XXX] = 1:03:15:00.000
```

```
=====
```

```
=====
```

```
=====
```

```
=====
```

```
UM_Model_03.ENTITYLIST[      i] = Entity_Name  Entity_Position
```

```
Entity_Content
```

```
=====
```

```
=====
```

```
=====
```

```
=====
```

```
UM_Model_03.ENTITYLIST is Empty!
```

```
UM_Model_03.Print_ENTITYLIST: (ENTITYLIST Result)
```

```
=====
```

```
Number of Entities = 0
```

```
GTime_Now [DDD:HH:MM:SS.XXX] = 1:03:15:00.000
```

```
ENTITYLIST is Empty!
```


5.3.4 DES_Modell_03 TDES_SINKED_ENTITY list free/busy list

Local time :Fri Oct 23 08:24:56 2020
 Model_Name : UM_Model_03

UM_Model_03.Print_DESEntityList_Short: (SINKED ENTITYLIST Result)

=====

Number of Entities = 1

GTime_Now [DDD:HH:MM:SS.XXX] = 1:03:15:00.000

=====

=====

=====

UM_Model_03.SINKED_ENTITYLIST[i] = Entity_Name Entity_Position

Borning_Time Terminate_Time Entity_Age

=====

=====

=====

UM_Model_03.SINKED_ENTITYLIST[0] = Person_State_(#28) (Sleeping__{TIn_Object})

0:00:00:00.000 1:03:15:00.000 1:03:15:00.000

5.3.5 DES_Modell_03 TDES_TASK list

Local time :Fri Oct 23 08:24:56 2020
Model_Name : UM_Model_03

5.3.6 DES_Modell_03 TBUFFER occupancy list

```
Local time :Fri Oct 23 08:24:56 2020  
Model_Name : UM_Model_03
```

```
UM_Model_03.Print_Content_Entities_Vector_Occupancy:  
=====
```

Number of DESObjects =	0
GTime_Now [DDD:HH:MM:SS.XXX] =	1:03:15:00.000

```
End of "UM_Model_03.Print_TBUFFEs_Occupancy"
```

5.3.7 DES_Model_03 Program results

Run of "DES_Single_DESBranch.py" has started!

Local time :Fri Oct 23 08:24:56 2020

Model_Name : UM_Model_03

UM_Model_03.Print ObjectList Short:

=====

Number of DESObjects = 5

GTime_Now [DDD:HH:MM:SS.XXX] = 0:00:00:00.000

=====

=====

=====

=====

UM_Model_03.DESObjectList[i] = DESObject_Name DESObject_Type State Last_Calculation_Time

DESObject_Content

=====

=====

=====

=====

UM_Model_03.DESObjectList[0] = Hungry TMACHINE TIdle 0:00:00:00.000

>x,x,x,x,x,x>-[x]->x,x,x,x,x,x> (Capacity = 1)

UM_Model_03.DESObjectList[1] = Just_awaken TSOURCE TIdle 0:00:00:00.000

>nil>-[x]->x,x,x,x,x,x> (Capacity = 1)

UM_Model_03.DESObjectList[2] = Sated TMACHINE TIdle 0:00:00:00.000

>x,x,x,x,x,x>-[x]->x,x,x,x,x,x> (Capacity = 1)

UM_Model_03.DESObjectList[3] = Sleeping TSINK TIdle 0:00:00:00.000

>x,x,x,x,x,x>-[x]->nil>

UM_Model_03.DESObjectList[4] = Wait TMACHINE TIdle 0:00:00:00.000

>x,x,x,x,x,x>-[x]->x,x,x,x,x,x> (Capacity = 1)

=====

=====

=====

=====

=====

=====

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=====

UM_Model_03.Print_DESBranch_TaskList:

```

=====
Number of DES_Tasks = 1
GTime_Now [DDD:HH:MM:SS.XXX] = 0:00:00:00.000
=====
=====
=====
UM_Model_03.DESTaskList [ i] = TaskTime Sender_Name DESObject_Type Command
Process# State Content
=====
=====
=====
UM_Model_03.DESTaskList [ 0] = 0:00:00:00.000 Just_awaken TSOURCE TDESOBJECT_Next_State
0 TIdle >nil>-[x]->x,x,x,x,x,x,x>

UM_Model_03.DESBranch_Calculate_Next_DESTask:
=====

UM_Model_03.Print_DESEntityList_Short: (ENTITYLIST Result)
=====
Number of Entities = 0
GTime_Now [DDD:HH:MM:SS.XXX] = 1:03:15:00.000
=====
=====
=====
UM_Model_03.ENTITYLIST[ i] = Entity_Name Entity_Position
Entity_Content
=====
=====
=====

UM_Model_03.ENTITYLIST is Empty!

```

UM_Model_03.Print ObjectList Short:

=====

Number of DESObjects = 5

GTime_Now [DDD:HH:MM:SS.XXX] = 1:03:15:00.000

=====

UM_Model_03.DESObjectList[i]	DESObject_Name	DESObject_Type	State	Last_Calculation_Time
DESObject_Content				

=====

UM_Model_03.DESObjectList[0]	Hungry	TMACHINE	TIdle	0:22:15:00.000
>x,x,x,x,x,x>-[x]->x,x,x,x,x,x>	(Capacity = 1)			
UM_Model_03.DESObjectList[1]	Just_awaken	TSOURCE	TIdle	0:00:00:01.000
>nil>-[x]->x,x,x,x,x,x>	(Capacity = 1)			
UM_Model_03.DESObjectList[2]	Sated	TMACHINE	TIdle	1:03:15:00.000
>x,x,x,x,x,x>-[x]->x,x,x,x,x,x>	(Capacity = 1)			
UM_Model_03.DESObjectList[3]	Sleeping	TSINK	TIdle	1:03:15:00.000
>x,x,x,x,x,x>-[x]->nil>				
UM_Model_03.DESObjectList[4]	Wait	TMACHINE	TIdle	0:01:00:00.000
>x,x,x,x,x,x>-[x]->x,x,x,x,x,x>	(Capacity = 1)			

UM_Model_03.Print_DESObjectList_Summary_Report (page 1 of 3):

=====

Number of DESObjects = 5

GTime_Now [DDD:HH:MM:SS.XXX] = 1:03:15:00.000

=====

UM_Model_03.DESObjectList[i]	DESObject_Name	DESObject_Type	Current_Content	Average_Content
Input_Entities#	Output_Entities#	Average_Staying_Time		

```

=====
=====
=====
UM_Model_03.DESObjectList[ 0] = Hungry TMACHINE 0 [entities]
5 5 0:00:25:00.000
UM_Model_03.DESObjectList[ 1] = Just_awaken TSOURCE 0 [entities]
0 1 0:00:00:00.000
UM_Model_03.DESObjectList[ 2] = Sated TMACHINE 0 [entities]
5 5 0:13:53:20.000
UM_Model_03.DESObjectList[ 3] = Sleeping TSINK 0 [entities]
1 0 0:00:00:00.000
UM_Model_03.DESObjectList[ 4] = Wait TMACHINE 0 [entities]
1 1 0:02:46:40.000

```

UM_Model_03.Print_DESObjectList_Summary_Report (page 2 of 3):

Number of DESObjects = 5

GTime_Now [DDD:HH:MM:SS.XXX] = 1:03:15:00.000

```

=====
=====
=====
UM_Model_03.DESObjectList[ i] = DESObject_Name DESObject_Type in TIdle state [%] in TBusy state [%]
in TBlocked state[%] in TFailed state [%] in TPaused state [%]
=====
=====
=====

```

```

=====
UM_Model_03.DESObjectList[ 0] = Hungry TMACHINE 22.02 77.98
0.00 0.00 0.00
UM_Model_03.DESObjectList[ 1] = Just_awaken TSOURCE 100.00 0.00
0.00 0.00 0.00
UM_Model_03.DESObjectList[ 2] = Sated TMACHINE 4.59 95.41
0.00 0.00 0.00
UM_Model_03.DESObjectList[ 3] = Sleeping TSINK 100.00 0.00
0.00 0.00 0.00
UM_Model_03.DESObjectList[ 4] = Wait TMACHINE 96.33 3.67
0.00 0.00 0.00

```

UM_Model_03.Print_DESObjectList_Summary_Report (page 3 of 3):

Number of DESObjects = 0

GTime_Now [DDD:HH:MM:SS.XXX] = 1:03:15:00.000

Occupancy of Content_Entities_Vector

UM_Model_03.DESObjectList[i] = DESObject_Name Oppupancy[%] of Content_Entities_Vector elements

Number_Of_Succesful_Entity_Move_Requests = 12

Number_Of_Source_Call =	3	(6.25 %)
Number_Of_Buffer_Call =	0	(0.00 %)
Number_Of_Machine_Call =	44	(91.67 %)
Number_Of_Sink_Call =	1	(2.08 %)
Number_Of_Wrapper_Call =	0	(0.00 %)
Number_Of_UnWrapper_Call =	0	(0.00 %)
Number_Of_Path_Call =	0	(0.00 %)
Number_Of_Lock_Call =	0	(0.00 %)
Number_Of_UnLock_Call =	0	(0.00 %)

Summa_DESObject_Call = 48 (100.00 %)

Number_Of_All_Objects_Call = 48

Number_Of_All_Entity_Move_Requests = 24

Number_Of_Process_Calculation_Cycles = 0

Number_Of_All_Calculation_Cycles = 72

Size of SINKED_ENTITYLIST = 1

```
#####
#####      DISCRETE EVENT SIMULATOR ERROR      #####
#####
```

In function "DESBranch_Calculate_Next_DESTask" -> .DESBranch_DESTaskList is EMPTY!

```
#####
#####
#####
```

Last Simulated Calculation Time [DAY:HH:MM:SS.XXX] = 1:03:15:00.000
DESBranch_Simulationtime_End ...[DAY:HH:MM:SS.XXX] = 100:00:00:00.000

Total Real Calculation Time [DAY:HH:MM:SS.XXX] = 0:00:00:00.006

Total Real Program Running Time [DAY:HH:MM:SS.XXX] = 0:00:00:00.023

Run of "DES_Single_DESBranch.py" has finished!

5.4 DES model 04

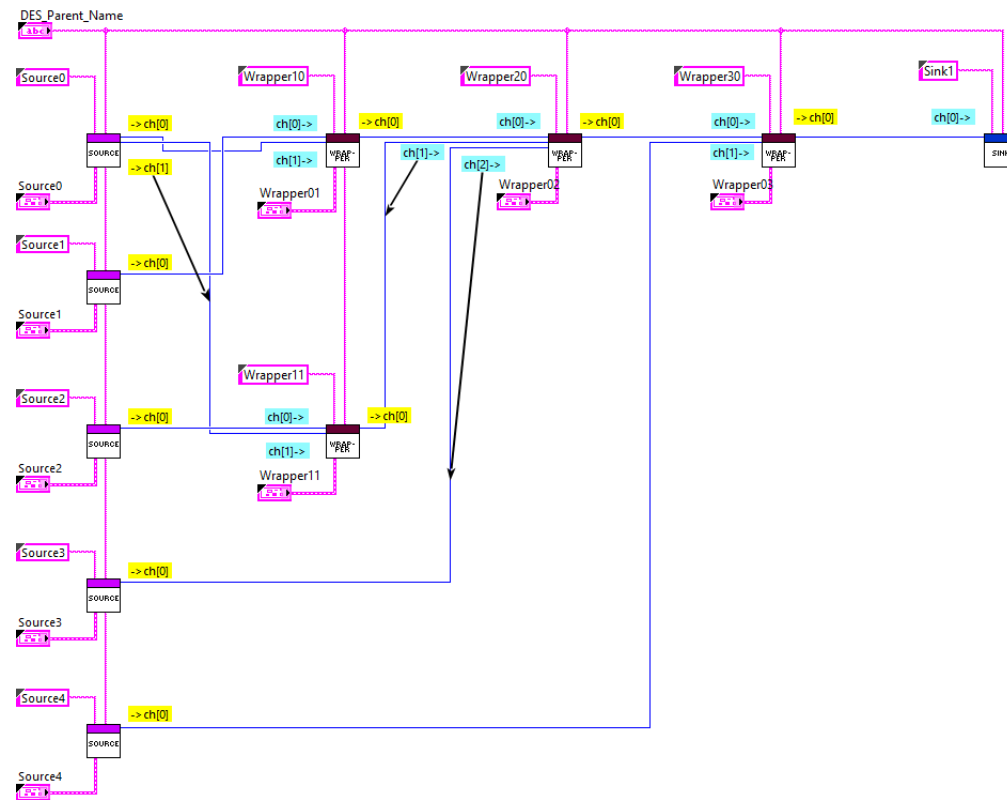


Figure 5.4.107 MODEL_04 block diagram of LabVIEW graphics editor in XE "Block diagram of LabVIEW graphics editor in program

MODEL 04 (.mp4 film)

The meaning of the icons in the figure is:



is the icon for the Source (**TSOURCE**) DES object.



icon of the **TWRAPPER** DES object.



is the icon of the Sink (**TSINK**) DES object.

ch[i]->

is the output of the DES object through the output channel i.

-> ch[k]

means the input to the DES object through the input channel k.

The simulation model shows how entities are bundled.

The list of results shows the simplified Entity list that exited the model and the detailed Entity list.

Source0

SOURCE_Name_Of_Produced_Entity_str Rekesz	SOURCE_Distribution TDistribution_Constant_Value		SOURCE_Maximum_Of_Time 0:00:00:03.000
SOURCE_First_Time_of_Entity_Creation 0:00:00:00.000 hour:minute:second.xxx	SOURCE_Constant_Value_Of_Time 0:00:00:01.000 hour:minute:second.xxx	SOURCE_Mean_Of_Time 0:00:00:01.000 hour:minute:second.xxx	SOURCE_Usual_Of_Time 0:00:00:02.000 hour:minute:second.xxx
SOURCE_Maximum_Batch_Size 2000000000		SOURCE_Deviation_Of_Time 0:00:00:01.000 hour:minute:second.xxx	SOURCE_Minimum_Of_Time 0:00:00:01.000 hour:minute:second.xxx
Capacity 1	OutputChannel_Index_Selection_Strategy TSelection_Random_Selected_Index		
	OutputChannel_Index 0		

Figure 5.4.108 MODEL_04/Source0 parameters

Source1

SOURCE_Name_Of_Produced_Entity_str Raklap1	SOURCE_Distribution TDistribution_Constant_Value		SOURCE_Maximum_Of_Time 0:00:00:03.000
SOURCE_First_Time_of_Entity_Creation 0:00:00:00.000 hour:minute:second.xxx	SOURCE_Constant_Value_Of_Time 0:00:01:01.000 hour:minute:second.xxx	SOURCE_Mean_Of_Time 0:00:00:01.000 hour:minute:second.xxx	SOURCE_Usual_Of_Time 0:00:00:02.000 hour:minute:second.xxx
SOURCE_Maximum_Batch_Size 2000000000		SOURCE_Deviation_Of_Time 0:00:00:01.000 hour:minute:second.xxx	SOURCE_Minimum_Of_Time 0:00:00:01.000 hour:minute:second.xxx
Capacity 1	OutputChannel_Index_Selection_Strategy TSelection_Random_Selected_Index		
	OutputChannel_Index 0		

Figure 5.4.109 MODEL_04/Source1 parameters

Source2

SOURCE_Name_Of_Produced_Entity_str Raklap2	SOURCE_Distribution TDistribution_Constant_Value		SOURCE_Maximum_Of_Time 0:00:00:03.000
SOURCE_First_Time_of_Entity_Creation 0:00:00:00.000 hour:minute:second.xxx	SOURCE_Constant_Value_Of_Time 0:00:01:01.000 hour:minute:second.xxx	SOURCE_Mean_Of_Time 0:00:00:01.000	SOURCE_Usual_Of_Time 0:00:00:02.000
SOURCE_Maximum_Batch_Size 2000000000		SOURCE_Deviation_Of_Time 0:00:00:01.000 hour:minute:second.xxx	SOURCE_Minimum_Of_Time 0:00:00:01.000 hour:minute:second.xxx
Capacity 1	OutputChannel_Index_Selection_Strategy TSelection_Random_Selected_Index		
	OutputChannel_Index 0		

Figure 5.4.110 MODEL_04/Source2 parameters

Source3

SOURCE_Name_Of_Produced_Entity_str Barack	SOURCE_Distribution TDistribution_Constant_Value		SOURCE_Maximum_Of_Time 0:00:00:03.000
SOURCE_First_Time_of_Entity_Creation 0:00:00:00.000 hour:minute:second.xxx	SOURCE_Constant_Value_Of_Time 0:00:01:01.000 hour:minute:second.xxx	SOURCE_Mean_Of_Time 0:00:00:01.000	SOURCE_Usual_Of_Time 0:00:00:02.000
SOURCE_Maximum_Batch_Size 2000000000		SOURCE_Deviation_Of_Time 0:00:00:01.000 hour:minute:second.xxx	SOURCE_Minimum_Of_Time 0:00:00:01.000 hour:minute:second.xxx
Capacity 1	OutputChannel_Index_Selection_Strategy TSelection_Random_Selected_Index		
	OutputChannel_Index 0		

Figure 5.4.111 MODEL_04/Source3 parameters

Source4

SOURCE_Name_Of_Produced_Entity_str	Alma		SOURCE_Distribution	TDistribution_Constant_Value		SOURCE_Maximum_Of_Time	0:00:00:03.000	
SOURCE_First_Time_of_Entity_Creation	0:00:00:00.000 hour:minute:second.xxx		SOURCE_Constant_Value_Of_Time	0:00:01:01.000 hour:minute:second.xxx		SOURCE_Mean_Of_Time	0:00:00:01.000	
SOURCE_Maximum_Batch_Size	2000000000					SOURCE_Deviation_Of_Time	0:00:00:01.000 hour:minute:second.xxx	
Capacity	1		OutputChannel_Index_Selection_Strategy	TSelection_Random_Selected_Index		SOURCE_Usual_Of_Time	0:00:00:02.000	
			OutputChannel_Index	0		SOURCE_Minimum_Of_Time	0:00:00:01.000 hour:minute:second.xxx	

Figure 5.4.112 MODEL_04/Source4 parameters

Wrapper10

WRAPPER_Entity_Request_At_Channel

0	1	1	0	0	0	0

Figure 5.4.113 MODEL_04/Wrapper10 parameters

Wrapper11

WRAPPER_Entity_Request_At_Channel

0	1	3	0	0	0	0

Figure 5.4.114 MODEL_04/Wrapper11 parameters

Wrapper20

WRAPPER_Entity_Request_At_Channel

0	1	2	2	0	0	0

Figure 5.4.115 MODEL_04/Wrapper20 parameters

Wrapper30

WRAPPER_Entity_Request_At_Channel

0	1	4	0	0	0	0

Figure 5.4.116 MODEL_04/Wrapper30 parameters

5.4.1 DES_Modell_04 Python program list

```
#####
#####
import sys
import time
from TDES_TYPES import *
from TDES_CHANNEL import *
from TDES_CONNECTION import *
from TDES_TASK import *
from TDES_ENTITY import *
from TDES_ENTITYLIST import *
from TDES_OBJECT import *
from TDES_BRANCH import *

#####
#####
#####
#####

class TUM_Model_04:

    #&&&&
    # 2020. 10. 09. 9:46:11

    def __init__(
        self,
        Model_Name_str,
    ):

        Branch = TDES_BRANCH(Model_Name_str)
        self.Branch = Branch
        self.Memo_str = ''
```



```

#####
#START OF TYPE DECLARATION
#Discrete Event Simulator

#####
#Initiate Branches
    Memol_str = ''
    Title_str = 'Initiate_DES_Branch:'
    Text_str = DES_Create_Text_Chain_str(
        len(Title_str),
        '='
    )
    Memol_str = Memol_str + Title_str + CRLF
    Memol_str = Memol_str + Text_str + CRLF

    #Branch = TDES_BRANCH(Branch_Name_str)
    Memol_str = Memol_str + 'Name_Of_Branch = ' + Branch.DESBranch_Name_str + CRLF

    Branch.DESBranch_Model_Name_str = 'DES_LabVIEW_Created_Model.py'
    Memol_str = Memol_str + 'Name_Of_Model = ' + Branch.DESBranch_Model_Name_str + CRLF


# #####
# Name of DES_OBJECT_10 = 'Sink1'
# #####
    DES_OBJECT_10 = TDES_OBJECT(
        TSINK,          #Object_Type
        'Sink1',        #Object_Name_str
        6,              #Inputs
        0,              #Outputs
    )

```

```

# ++++++
# Name of DES_OBJECT_1 = 'Source0'
# ++++++
    DES_OBJECT_1 = TDES_OBJECT(
        TSOURCE,          #Object_Type
        'Source0',        #Object_Name_str
        0,                #Inputs
        6,                #Outputs
    )

DES_OBJECT_1.DESObject_OutputChannel_Index_Selection_Strategy.Set_Item_str_to('TSelection_Random_Selected_Index')
DES_OBJECT_1.DESObject_OutputChannel_Index = 0

DES_OBJECT_1.SOURCE_Minimum_Of_Time = 1.000
DES_OBJECT_1.SOURCE_Usual_Of_Time = 2.000
DES_OBJECT_1.SOURCE_Maximum_Of_Time = 3.000
DES_OBJECT_1.SOURCE_Deviation_Of_Time = 1.000
DES_OBJECT_1.SOURCE_Mean_Of_Time = 1.000
DES_OBJECT_1.SOURCE_Constant_Value_Of_Time = 1.000

DES_OBJECT_1.SOURCE_Distribution.Set_Item_str_to('TDistribution_Constant_Value')
"""
TDES_Distribution =(
    'TDistribution_Constant_Value',      #=0
    'TDistribution_Exponential_Mean',    #=1
    'TDistribution_Normal_Mean_Deviation', #=2
    'TDistribution_Triangle_Minimum_Usual_Maximum', #=3
    'TDistribution_Uniform_Minimum_Maximum' #=4
)
"""
DES_OBJECT_1.SOURCE_Created_Entity.DESEntity_Name_str = 'Rekesz_01'
DES_OBJECT_1.SOURCE_First_Time_of_Entity_Creation = 0.000

DES_OBJECT_1.SOURCE_Maximum_Batch_Size = 2000000000

```

```

DES_OBJECT_1.DESObject_Capacity = 1

# ++++++
# Name of DES_OBJECT_4 = 'Source1'
# ++++++
DES_OBJECT_4 = TDES_OBJECT(
    TSOURCE,          #Object_Type
    'Source1',        #Object_Name_str
    0,                #Inputs
    6,                #Outputs
)

DES_OBJECT_4.DESObject_OutputChannel_Index_Selection_Strategy.Set_Item_str_to('TSelection_Random_Selected_Index')
DES_OBJECT_4.DESObject_OutputChannel_Index = 0

DES_OBJECT_4.SOURCE_Minimum_Of_Time = 1.000
DES_OBJECT_4.SOURCE_Usual_Of_Time = 2.000
DES_OBJECT_4.SOURCE_Maximum_Of_Time = 3.000
DES_OBJECT_4.SOURCE_Deviation_Of_Time = 1.000
DES_OBJECT_4.SOURCE_Mean_Of_Time = 1.000
DES_OBJECT_4.SOURCE_Constant_Value_Of_Time = 61.000

DES_OBJECT_4.SOURCE_Distribution.Set_Item_str_to('TDistribution_Constant_Value')
"""
TDES_Distribution =(
    'TDistribution_Constant_Value',          #=0
    'TDistribution_Exponential_Mean',        #=1
    'TDistribution_Normal_Mean_Deviation',   #=2
    'TDistribution_Triangle_Minimum_Usual_Maximum',  #=3
    'TDistribution_Uniform_Minimum_Maximum' #=4
)
"""
DES_OBJECT_4.SOURCE_Created_Entity.DESEntity_Name_str = 'Rekesz_02'
DES_OBJECT_4.SOURCE_First_Time_of_Entity_Creation = 0.000

DES_OBJECT_4.SOURCE_Maximum_Batch_Size = 2000000000

```

```

DES_OBJECT_4.DESObject_Capacity = 1

# ++++++
# Name of DES_OBJECT_3 = 'Source2'
# ++++++
DES_OBJECT_3 = TDES_OBJECT(
    TSOURCE,          #Object_Type
    'Source2',        #Object_Name_str
    0,                #Inputs
    6,                #Outputs
)

DES_OBJECT_3.DESObject_OutputChannel_Index_Selection_Strategy.Set_Item_str_to('TSelection_Random_Selected_Index')
DES_OBJECT_3.DESObject_OutputChannel_Index = 0

DES_OBJECT_3.SOURCE_Minimum_Of_Time = 1.000
DES_OBJECT_3.SOURCE_Usual_Of_Time = 2.000
DES_OBJECT_3.SOURCE_Maximum_Of_Time = 3.000
DES_OBJECT_3.SOURCE_Deviation_Of_Time = 1.000
DES_OBJECT_3.SOURCE_Mean_Of_Time = 1.000
DES_OBJECT_3.SOURCE_Constant_Value_Of_Time = 61.000

DES_OBJECT_3.SOURCE_Distribution.Set_Item_str_to('TDistribution_Constant_Value')
"""
TDES_Distribution =(
    'TDistribution_Constant_Value',      #=0
    'TDistribution_Exponential_Mean',    #=1
    'TDistribution_Normal_Mean_Deviation', #=2
    'TDistribution_Triangle_Minimum_Usual_Maximum', #=3
    'TDistribution_Uniform_Minimum_Maximum' #=4
)
"""
DES_OBJECT_3.SOURCE_Created_Entity.DESEntity_Name_str = 'Rekesz_03'
DES_OBJECT_3.SOURCE_First_Time_of_Entity_Creation = 0.000

```

```

DES_OBJECT_3.SOURCE_Maximum_Batch_Size = 2000000000

DES_OBJECT_3.DESObject_Capacity = 1

# ++++++
# Name of DES_OBJECT_5 = 'Source3'
# ++++++
DES_OBJECT_5 = TDES_OBJECT(
    TSOURCE,          #Object_Type
    'Source3',        #Object_Name_str
    0,                #Inputs
    6,                #Outputs
)

DES_OBJECT_5.DESObject_OutputChannel_Index_Selection_Strategy.Set_Item_str_to('TSelection_Random_Selected_Index')
DES_OBJECT_5.DESObject_OutputChannel_Index = 0

DES_OBJECT_5.SOURCE_Minimum_Of_Time = 1.000
DES_OBJECT_5.SOURCE_Usual_Of_Time = 2.000
DES_OBJECT_5.SOURCE_Maximum_Of_Time = 3.000
DES_OBJECT_5.SOURCE_Deviation_Of_Time = 1.000
DES_OBJECT_5.SOURCE_Mean_Of_Time = 1.000
DES_OBJECT_5.SOURCE_Constant_Value_Of_Time = 61.000

DES_OBJECT_5.SOURCE_Distribution.Set_Item_str_to('TDistribution_Constant_Value')
"""
TDES_Distribution =(
    'TDistribution_Constant_Value',      #=0
    'TDistribution_Exponential_Mean',    #=1
    'TDistribution_Normal_Mean_Deviation', #=2
    'TDistribution_Triangle_Minimum_Usual_Maximum', #=3
    'TDistribution_Uniform_Minimum_Maximum' #=4
)
"""
DES_OBJECT_5.SOURCE_Created_Entity.DESEntity_Name_str = 'Barack'
DES_OBJECT_5.SOURCE_First_Time_of_Entity_Creation = 0.000

```

```

DES_OBJECT_5.SOURCE_Maximum_Batch_Size = 2000000000

DES_OBJECT_5.DESObject_Capacity = 1

# ++++++
# Name of DES_OBJECT_2 = 'Source4'
# ++++++
DES_OBJECT_2 = TDES_OBJECT(
    TSOURCE,          #Object_Type
    'Source4',        #Object_Name_str
    0,                #Inputs
    6,                #Outputs
)

DES_OBJECT_2.DESObject_OutputChannel_Index_Selection_Strategy.Set_Item_str_to('TSelection_Random_Selected_Index')
DES_OBJECT_2.DESObject_OutputChannel_Index = 0

DES_OBJECT_2.SOURCE_Minimum_Of_Time = 1.000
DES_OBJECT_2.SOURCE_Usual_Of_Time = 2.000
DES_OBJECT_2.SOURCE_Maximum_Of_Time = 3.000
DES_OBJECT_2.SOURCE_Deviation_Of_Time = 1.000
DES_OBJECT_2.SOURCE_Mean_Of_Time = 1.000
DES_OBJECT_2.SOURCE_Constant_Value_Of_Time = 61.000

DES_OBJECT_2.SOURCE_Distribution.Set_Item_str_to('TDistribution_Constant_Value')
"""
TDES_Distribution =(
    'TDistribution_Constant_Value',      #=0
    'TDistribution_Exponential_Mean',    #=1
    'TDistribution_Normal_Mean_Deviation', #=2
    'TDistribution_Triangle_Minimum_Usual_Maximum', #=3
    'TDistribution_Uniform_Minimum_Maximum' #=4
)
"""
DES_OBJECT_2.SOURCE_Created_Entity.DESEntity_Name_str = 'Alma'

```

```

DES_OBJECT_2.SOURCE_First_Time_of_Entity_Creation = 0.000

DES_OBJECT_2.SOURCE_Maximum_Batch_Size = 2000000000

DES_OBJECT_2.DESObject_Capacity = 1

# ++++++
# Name of DES_OBJECT_7 = 'Wrapper01'
# ++++++
DES_OBJECT_7 = TDES_OBJECT(
    TWRAPPER,          #Object_Type
    'Wrapper01',       #Object_Name_str
    6,                 #Inputs
    1,                 #Outputs
)

DES_OBJECT_7.WRAPPER_Entity_Request_At_Channel[0] = 1;
DES_OBJECT_7.WRAPPER_Entity_Request_At_Channel[1] = 1;
DES_OBJECT_7.WRAPPER_Entity_Request_At_Channel[2] = 0;
DES_OBJECT_7.WRAPPER_Entity_Request_At_Channel[3] = 0;
DES_OBJECT_7.WRAPPER_Entity_Request_At_Channel[4] = 0;
DES_OBJECT_7.WRAPPER_Entity_Request_At_Channel[5] = 0;

# ++++++
# Name of DES_OBJECT_8 = 'Wrapper02'
# ++++++
DES_OBJECT_8 = TDES_OBJECT(
    TWRAPPER,          #Object_Type
    'Wrapper02',       #Object_Name_str
    6,                 #Inputs
    1,                 #Outputs
)

DES_OBJECT_8.WRAPPER_Entity_Request_At_Channel[0] = 1;
DES_OBJECT_8.WRAPPER_Entity_Request_At_Channel[1] = 2;
DES_OBJECT_8.WRAPPER_Entity_Request_At_Channel[2] = 2;
DES_OBJECT_8.WRAPPER_Entity_Request_At_Channel[3] = 0;

```

```

DES_OBJECT_8.WRAPPER_Entity_Request_At_Channel[4] = 0;
DES_OBJECT_8.WRAPPER_Entity_Request_At_Channel[5] = 0;

# ++++++
# Name of DES_OBJECT_9 = 'Wrapper03'
# ++++++
DES_OBJECT_9 = TDES_OBJECT(
    TWRAPPER,          #Object_Type
    'Wrapper03',        #Object_Name_str
    6,                  #Inputs
    1,                  #Outputs
)

DES_OBJECT_9.WRAPPER_Entity_Request_At_Channel[0] = 1;
DES_OBJECT_9.WRAPPER_Entity_Request_At_Channel[1] = 4;
DES_OBJECT_9.WRAPPER_Entity_Request_At_Channel[2] = 0;
DES_OBJECT_9.WRAPPER_Entity_Request_At_Channel[3] = 0;
DES_OBJECT_9.WRAPPER_Entity_Request_At_Channel[4] = 0;
DES_OBJECT_9.WRAPPER_Entity_Request_At_Channel[5] = 0;

# ++++++
# Name of DES_OBJECT_6 = 'Wrapper11'
# ++++++
DES_OBJECT_6 = TDES_OBJECT(
    TWRAPPER,          #Object_Type
    'Wrapper11',        #Object_Name_str
    6,                  #Inputs
    1,                  #Outputs
)

DES_OBJECT_6.WRAPPER_Entity_Request_At_Channel[0] = 1;
DES_OBJECT_6.WRAPPER_Entity_Request_At_Channel[1] = 3;
DES_OBJECT_6.WRAPPER_Entity_Request_At_Channel[2] = 0;
DES_OBJECT_6.WRAPPER_Entity_Request_At_Channel[3] = 0;
DES_OBJECT_6.WRAPPER_Entity_Request_At_Channel[4] = 0;
DES_OBJECT_6.WRAPPER_Entity_Request_At_Channel[5] = 0;

```



```
#+++++
#Insert of DES_OBJECT into DESObjectList of DES_BRANCH
    Memol_str =Memol_str + CRLF + CRLF

    Title_str ='Insert_DES_Object_Into_DES_ObjectList:'
    Text_str   =DES_Create_Text_Chain_str(
        len(Title_str),
        '='
    )
    Memol_str =Memol_str + Title_str + CRLF + Text_str + CRLF

#+++++

# &&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&
# Insert of DES_OBJECTs into DESObjectList of DES_BRANCH

# +++++

Branch.DESBranch_Insert_DESObject_Into_DESObjectList ( DES_OBJECT_10)      # Sink1
Branch.DESBranch_Insert_DESObject_Into_DESObjectList ( DES_OBJECT_1)       # Source0
Branch.DESBranch_Insert_DESObject_Into_DESObjectList ( DES_OBJECT_4)       # Source1
Branch.DESBranch_Insert_DESObject_Into_DESObjectList ( DES_OBJECT_3)       # Source2
Branch.DESBranch_Insert_DESObject_Into_DESObjectList ( DES_OBJECT_5)       # Source3
Branch.DESBranch_Insert_DESObject_Into_DESObjectList ( DES_OBJECT_2)       # Source4
Branch.DESBranch_Insert_DESObject_Into_DESObjectList ( DES_OBJECT_7)       # Wrapper01
Branch.DESBranch_Insert_DESObject_Into_DESObjectList ( DES_OBJECT_8)       # Wrapper02
Branch.DESBranch_Insert_DESObject_Into_DESObjectList ( DES_OBJECT_9)       # Wrapper03
Branch.DESBranch_Insert_DESObject_Into_DESObjectList ( DES_OBJECT_6)       # Wrapper11

# +++++

#+++++
```

```

#Insert of DES_CONNECTIONS into DESConnectionList of DES_BRANCH
    Memol_str =Memol_str + CRLF + CRLF
    Title_str ='Insert_DES_Connection_To_DESConnectionList:'
    Text_str  =DES_Create_Text_Chain_str(
        len(Title_str),  #unsigned int n,
        '='              #string text
    )
    Memol_str =Memol_str + Title_str + CRLF + Text_str + CRLF
#+++++

# #####
# Insert of DES_CONNECTIONs into DESConnectionList of DES_BRANCH

# DESBranch_DESConnectionList [0]
# +++++
    DES_Connection = TDES_CONNECTION()
    DES_Connection.DESConnection_DESBranch_Name_OUT_str  = Branch.DESBranch_Name_str
    DES_Connection.DESConnection_DESObject_Name_OUT_str  = 'Source1'
    DES_Connection.DESConnection_DESObject_Channel_Index_OUT  = 0

    DES_Connection.DESConnection_DESBranch_Name_IN_str  = Branch.DESBranch_Name_str
    DES_Connection.DESConnection_DESObject_Name_IN_str  = 'Wrapper01'
    DES_Connection.DESConnection_DESObject_Channel_Index_IN  = 0

    DES_Connection.DESConnection_Enabled_bool = True

    DES_Connection.DESConnection_TRACED_bool = False

    Branch.DESBranch_Insert_Connection_Into_DESConnectionList(DES_Connection,)
# +++++

# DESBranch_DESConnectionList [1]

```

```
# ++++++
DES_Connection = TDES_CONNECTION()
DES_Connection.DESConnection_DESBranch_Name_OUT_str = Branch.DESBranch_Name_str
DES_Connection.DESConnection_DESObject_Name_OUT_str = 'Source0'
DES_Connection.DESConnection_DESObject_Channel_Index_OUT = 0

DES_Connection.DESConnection_DESBranch_Name_IN_str = Branch.DESBranch_Name_str
DES_Connection.DESConnection_DESObject_Name_IN_str = 'Wrapper01'
DES_Connection.DESConnection_DESObject_Channel_Index_IN = 1

DES_Connection.DESConnection_Enabled_bool = True

DES_Connection.DESConnection_TRACED_bool = False

Branch.DESBranch_Insert_Connection_Into_DESConnectionList(DES_Connection,)
# ++++++

# DESBranch_DESConnectionList [2]
# ++++++
DES_Connection = TDES_CONNECTION()
DES_Connection.DESConnection_DESBranch_Name_OUT_str = Branch.DESBranch_Name_str
DES_Connection.DESConnection_DESObject_Name_OUT_str = 'Source2'
DES_Connection.DESConnection_DESObject_Channel_Index_OUT = 0

DES_Connection.DESConnection_DESBranch_Name_IN_str = Branch.DESBranch_Name_str
DES_Connection.DESConnection_DESObject_Name_IN_str = 'Wrapper11'
DES_Connection.DESConnection_DESObject_Channel_Index_IN = 0

DES_Connection.DESConnection_Enabled_bool = True

DES_Connection.DESConnection_TRACED_bool = False

Branch.DESBranch_Insert_Connection_Into_DESConnectionList(DES_Connection,)
# ++++++
```

```

# DESBranch_DESConnectionList [3]
# ++++++
    DES_Connection = TDES_CONNECTION()
    DES_Connection.DESConnection_DESBranch_Name_OUT_str = Branch.DESBranch_Name_str
    DES_Connection.DESConnection_DESObject_Name_OUT_str = 'Source0'
    DES_Connection.DESConnection_DESObject_Channel_Index_OUT = 1

    DES_Connection.DESConnection_DESBranch_Name_IN_str = Branch.DESBranch_Name_str
    DES_Connection.DESConnection_DESObject_Name_IN_str = 'Wrapper11'
    DES_Connection.DESConnection_DESObject_Channel_Index_IN = 1

    DES_Connection.DESConnection_Enabled_bool = True

    DES_Connection.DESConnection_TRACED_bool = False

    Branch.DESBranch_Insert_Connection_Into_DESConnectionList(DES_Connection,)
# ++++++

# DESBranch_DESConnectionList [4]
# ++++++
    DES_Connection = TDES_CONNECTION()
    DES_Connection.DESConnection_DESBranch_Name_OUT_str = Branch.DESBranch_Name_str
    DES_Connection.DESConnection_DESObject_Name_OUT_str = 'Wrapper01'
    DES_Connection.DESConnection_DESObject_Channel_Index_OUT = 0

    DES_Connection.DESConnection_DESBranch_Name_IN_str = Branch.DESBranch_Name_str
    DES_Connection.DESConnection_DESObject_Name_IN_str = 'Wrapper02'
    DES_Connection.DESConnection_DESObject_Channel_Index_IN = 0

    DES_Connection.DESConnection_Enabled_bool = True

    DES_Connection.DESConnection_TRACED_bool = False

    Branch.DESBranch_Insert_Connection_Into_DESConnectionList(DES_Connection,)
# ++++++

```

```

# DESBranch_DESConnectionList [5]
# ++++++
    DES_Connection = TDES_CONNECTION()
    DES_Connection.DESConnection_DESBranch_Name_OUT_str = Branch.DESBranch_Name_str
    DES_Connection.DESConnection_DESObject_Name_OUT_str = 'Wrapper11'
    DES_Connection.DESConnection_DESObject_Channel_Index_OUT = 0

    DES_Connection.DESConnection_DESBranch_Name_IN_str = Branch.DESBranch_Name_str
    DES_Connection.DESConnection_DESObject_Name_IN_str = 'Wrapper02'
    DES_Connection.DESConnection_DESObject_Channel_Index_IN = 1

    DES_Connection.DESConnection_Enabled_bool = True

    DES_Connection.DESConnection_TRACED_bool = False

    Branch.DESBranch_Insert_Connection_Into_DESConnectionList(DES_Connection,)
# ++++++

# DESBranch_DESConnectionList [6]
# ++++++
    DES_Connection = TDES_CONNECTION()
    DES_Connection.DESConnection_DESBranch_Name_OUT_str = Branch.DESBranch_Name_str
    DES_Connection.DESConnection_DESObject_Name_OUT_str = 'Source3'
    DES_Connection.DESConnection_DESObject_Channel_Index_OUT = 0

    DES_Connection.DESConnection_DESBranch_Name_IN_str = Branch.DESBranch_Name_str
    DES_Connection.DESConnection_DESObject_Name_IN_str = 'Wrapper02'
    DES_Connection.DESConnection_DESObject_Channel_Index_IN = 2

    DES_Connection.DESConnection_Enabled_bool = True

    DES_Connection.DESConnection_TRACED_bool = False

    Branch.DESBranch_Insert_Connection_Into_DESConnectionList(DES_Connection,)
# ++++++

```

```

# DESBranch_DESConnectionList [7]
# ++++++
    DES_Connection = TDES_CONNECTION()
    DES_Connection.DESConnection_DESBranch_Name_OUT_str = Branch.DESBranch_Name_str
    DES_Connection.DESConnection_DESObject_Name_OUT_str = 'Wrapper02'
    DES_Connection.DESConnection_DESObject_Channel_Index_OUT = 0

    DES_Connection.DESConnection_DESBranch_Name_IN_str = Branch.DESBranch_Name_str
    DES_Connection.DESConnection_DESObject_Name_IN_str = 'Wrapper03'
    DES_Connection.DESConnection_DESObject_Channel_Index_IN = 0

    DES_Connection.DESConnection_Enabled_bool = True

    DES_Connection.DESConnection_TRACED_bool = False

    Branch.DESBranch_Insert_Connection_Into_DESConnectionList(DES_Connection,)
# ++++++

# DESBranch_DESConnectionList [8]
# ++++++
    DES_Connection = TDES_CONNECTION()
    DES_Connection.DESConnection_DESBranch_Name_OUT_str = Branch.DESBranch_Name_str
    DES_Connection.DESConnection_DESObject_Name_OUT_str = 'Source4'
    DES_Connection.DESConnection_DESObject_Channel_Index_OUT = 0

    DES_Connection.DESConnection_DESBranch_Name_IN_str = Branch.DESBranch_Name_str
    DES_Connection.DESConnection_DESObject_Name_IN_str = 'Wrapper03'
    DES_Connection.DESConnection_DESObject_Channel_Index_IN = 1

    DES_Connection.DESConnection_Enabled_bool = True

    DES_Connection.DESConnection_TRACED_bool = False

    Branch.DESBranch_Insert_Connection_Into_DESConnectionList(DES_Connection,)
# ++++++

```

[illegible]

5.4.2 DES_Modell_04 TDES_OBJECT list

Local time :Fri Oct 23 18:45:46 2020
 Model_Name : UM_Model_04

UM_Model_04.Print ObjectList Short:

Number of DESObjects = 10
 GTime_Now [DDD:HH:MM:SS.XXX] = 0:00:30:30.000

```
=====
UM_Model_04.DESObjectList[    i] = DESObject_Name  DESObject_Type    State      Last_Calculation_Time
DESObject_Content
=====
=====
UM_Model_04.DESObjectList[    0] =          Sink1          TSINK      TIdle      0:00:28:28.000
>x,x,x,x,x,x>-[x]->nil>
UM_Model_04.DESObjectList[    1] =          Source0          TSOURCE  TBlocked  0:00:29:34.000
>nil>-[#194]->#186,#193,x,x,x,x>    (Capacity = 1)
UM_Model_04.DESObjectList[    2] =          Source1          TSOURCE      TIdle      0:00:29:29.000
>nil>-[x]->#191,x,x,x,x,x>    (Capacity = 1)
UM_Model_04.DESObjectList[    3] =          Source2          TSOURCE  TBlocked  0:00:29:29.000
>nil>-[x]->x,x,x,x,x,x>    (Capacity = 1)
UM_Model_04.DESObjectList[    4] =          Source3          TSOURCE  TBlocked  0:00:29:29.000
>nil>-[x]->x,x,x,x,x,x>    (Capacity = 1)
UM_Model_04.DESObjectList[    5] =          Source4          TSOURCE  TBlocked  0:00:30:30.000
>nil>-[x]->#190,x,x,x,x,x>    (Capacity = 1)
UM_Model_04.DESObjectList[    6] =      Wrapper01      TWRAPPER  TBlocked  0:00:28:28.000
>{x},{x},{x},{x},{x},{x}>-[x]->#163>    (TWrapper_Waiting_for_Sending_Away_Packed_Entities)
UM_Model_04.DESObjectList[    7] =      Wrapper02      TWRAPPER  TBlocked  0:00:29:29.000
>{x},{x},{x},{x},{x},{x}>-[x]->#159>    (TWrapper_Waiting_for_Sending_Away_Packed_Entities)
```



```

UM_Model_04.DESObjectList[ 8] = Wrapper03 TWRAPPER TBusy 0:00:29:29.000
>{x},x,{x},{x},{x},{x}>-[#131]->{x}> (TWrapper_Waiting_for_Packing_Entities)
Rekesz_02_04(#131).Content=[#139, #151, #165, #166, #167, #185, ]
UM_Model_04.DESObjectList[ 9] = Wrapper11 TWRAPPER TBlocked 0:00:29:31.000
>{x},{x},{x},{x},{x},{x}>-[x]->#183> (TWrapper_Waiting_for_Sending_Away_Packed_Entities)

```

```

UM_Model_04.Print_DESObjectList:
=====

```

```

Number of DESObjects = 10
GTime_Now [DDD:HH:MM:SS.XXX] = 0:00:30:30.000

```

```

#####
#####
UM_Model_04.DESBranch_DESObjectList[ 0]

```

```

*****
TSINK_start_TSINK_start_TSINK_start_TSINK_start_TSINK_start_TSINK_start_TSINK_
+++++

```

```

UM_Model_04.Sink1.SINK_Last_Content_Entity_ID_Number =#0
UM_Model_04.Sink1.SINK_NumberOfSinkedObjects =112

```

```

UM_Model_04.Sink1.SINK_Last_Calculation_Time = 0:00:28:28.000
.....

```

```

UM_Model_04.Sink1.DESObject_Owner_class =<TDES_BRANCH.TDES_BRANCH object at 0x0000022D10CBCC70> (UM_Model_04)

```

```

UM_Model_04.Sink1.DESObject_Name_str =Sink1
UM_Model_04.Sink1.DESObject_ID_Number =12
UM_Model_04.Sink1.DESObject_Type =TSINK

```

```

UM_Model_04.Sink1.DESObject_Priority_To_DESEntity_From_DESObject =0
UM_Model_04.Sink1.DESBranch_Name_str =UM_Model_04

```

```
UM_Model_04.Sink1.DESObject_Commanded_State_In_Previous_Step =TCommanded_Enabled_State
UM_Model_04.Sink1.DESObject_Commanded_State =TCommanded_Enabled_State
```

```
UM_Model_04.Sink1.DESObject_Work_State =TIdle
UM_Model_04.Sink1.DESObject_Work_State_In_Previous_Step =TIdle
UM_Model_04.Sink1.DESObject_Work_State_Before_Fail_Or_Pause =TIdle
```

```
UM_Model_04.Sink1.Time_Percent_In_Statuses[ TIdle] =100.000
UM_Model_04.Sink1.Time_Percent_In_Statuses[ TBusy] = 0.000
UM_Model_04.Sink1.Time_Percent_In_Statuses[TBlocked] = 0.000
UM_Model_04.Sink1.Time_Percent_In_Statuses[ TFailed] = 0.000
UM_Model_04.Sink1.Time_Percent_In_Statuses[ TPaused] = 0.000
```

UM_Model_04.Sink1.System_Attributes[i]	=	Name	Value
UM_Model_04.Sink1.System_Attributes[0]	=	WORKED_Entity_Sample_Number	7
UM_Model_04.Sink1.System_Attributes[1]	=	WORKED_Entity_Sample_Summa	0.0
UM_Model_04.Sink1.System_Attributes[2]	=	WORKED_Entity_Average_Staying_Time_in_DESObject	

0:00:00:00.000

```
UM_Model_04.Sink1.First_Calculation? =False
```

```
UM_Model_04.Sink1.InputChannel_Index_Selection_Strategy =TSelection_Random_Selected_Index
UM_Model_04.Sink1.InputChannel_Index =0
```

```
UM_Model_04.Sink1.Number_Of_InputChannels =6
```

```
UM_Model_04.Sink1.Input [ 0].Data =#Empty
UM_Model_04.Sink1.Input [ 0].Channel_Is_Enabled =True
UM_Model_04.Sink1.Input [ 0].Channel_Is_Connected =True (#_of_Entities= 7)
```

```
UM_Model_04.Sink1.Input [ 1].Data =#Empty
UM_Model_04.Sink1.Input [ 1].Channel_Is_Enabled =True
UM_Model_04.Sink1.Input [ 1].Channel_Is_Connected =False (#_of_Entities= 0)
```

```
UM_Model_04.Sink1.Input [ 2].Data =#Empty
UM_Model_04.Sink1.Input [ 2].Channel_Is_Enabled =True
UM_Model_04.Sink1.Input [ 2].Channel_Is_Connected =False (#_of_Entities= 0)
```

```
UM_Model_04.Sink1.Input [ 3].Data =#Empty
UM_Model_04.Sink1.Input [ 3].Channel_Is_Enabled =True
UM_Model_04.Sink1.Input [ 3].Channel_Is_Connected =False    (#_of_Entities= 0)
```

```
UM_Model_04.Sink1.Input [ 4].Data =#Empty
UM_Model_04.Sink1.Input [ 4].Channel_Is_Enabled =True
UM_Model_04.Sink1.Input [ 4].Channel_Is_Connected =False    (#_of_Entities= 0)
```

```
UM_Model_04.Sink1.Input [ 5].Data =#Empty
UM_Model_04.Sink1.Input [ 5].Channel_Is_Enabled =True
UM_Model_04.Sink1.Input [ 5].Channel_Is_Connected =False    (#_of_Entities= 0)
```

```
UM_Model_04.Sink1.Capacity =1
UM_Model_04.Sink1.Number_Of_Content_Entities =0
```

```
*****
TSINK_end_TSINK_end_TSINK_end_TSINK_end_TSINK_end_TSINK_end_TSINK_end_TSINK_end_
-----
```

```
#####
#####
UM_Model_04.DESBranch_DESObjectList[    1]
```

```
*****
TSOURCE_start_TSOURCE_start_TSOURCE_start_TSOURCE_start_TSOURCE_start_TSOURCE_
+++++
```

```
UM_Model_04.Source0.SOURCE_Created_Entity.Name_str =Rekesz_01
```

```
UM_Model_04.Source0.SOURCE_Time_Of_Next_Launching =  0:00:29:34.000
UM_Model_04.Source0.SOURCE_Time_Step =  0:00:00:01.000
```

```
UM_Model_04.Source0.SOURCE_Distribution =TDistribution_Constant_Value
```

```
UM_Model_04.Source0.SOURCE_Constant_Value_Of_Time =  0:00:00:01.000
```

```

UM_Model_04.Source0.SOURCE_Mean_Of_Time = 0:00:00:01.000
UM_Model_04.Source0.SOURCE_Deviation_Of_Time = 0:00:00:01.000
UM_Model_04.Source0.SOURCE_Maximum_Of_Time = 0:00:00:03.000
UM_Model_04.Source0.SOURCE_Usual_Of_Time = 0:00:00:02.000
UM_Model_04.Source0.SOURCE_Minimum_Of_Time = 0:00:00:01.000

UM_Model_04.Source0.SOURCE_Maximum_Batch_Size =2000000000
UM_Model_04.Source0.SOURCE_Number_Of_Created_Objects =67

UM_Model_04.Source0.SOURCE_Last_Calculation_Time = 0:00:29:34.000
.....

UM_Model_04.Source0.DESObject_Owner_class =<TDES_BRANCH.TDES_BRANCH object at 0x0000022D10CBCC70> (UM_Model_04)

UM_Model_04.Source0.DESObject_Name_str =Source0
UM_Model_04.Source0.DESObject_ID_Number =13
UM_Model_04.Source0.DESObject_Type =TSOURCE

UM_Model_04.Source0.DESObject_Priority_To_DESEntity_From_DESObject =0
UM_Model_04.Source0.DESBranch_Name_str =UM_Model_04

UM_Model_04.Source0.DESObject_Commanded_State_In_Previous_Step =TCommanded_Enabled_State
UM_Model_04.Source0.DESObject_Commanded_State =TCommanded_Enabled_State

UM_Model_04.Source0.DESObject_Work_State =TBlocked
UM_Model_04.Source0.DESObject_Work_State_In_Previous_Step =TBlocked
UM_Model_04.Source0.DESObject_Work_State_Before_Fail_Or_Pause =TBlocked

UM_Model_04.Source0.Time_Percent_In_Statuses[ TIdle] = 3.279
UM_Model_04.Source0.Time_Percent_In_Statuses[ TBusy] = 0.000
UM_Model_04.Source0.Time_Percent_In_Statuses[TBlocked] = 96.721
UM_Model_04.Source0.Time_Percent_In_Statuses[ TFailed] = 0.000
UM_Model_04.Source0.Time_Percent_In_Statuses[ TPaused] = 0.000

UM_Model_04.Source0.System_Attributes[ i] = Name
Value
UM_Model_04.Source0.System_Attributes[ 0] = WORKED_Entity_Sample_Number

```

```

UM_Model_04.Source0.System_Attributes[ 1] = WORKED_Entity_Sample_Summa
1713.0
UM_Model_04.Source0.System_Attributes[ 2] = WORKED_Entity_Average_Staying_Time_in_DESObject
0:00:00:24.826
UM_Model_04.Source0.System_Attributes[ 3] = WORKED_Entity_Through_Output_Rate at Output_Channel[0]
0.0056433 [entity/seconds]
UM_Model_04.Source0.System_Attributes[ 4] = WORKED_Entity_Produce_Time at Output_Channel[0]
177.2000000 [seconds/entity]
UM_Model_04.Source0.System_Attributes[ 5] = WORKED_Entity_Through_Output_Rate at Output_Channel[1]
0.0321670 [entity/seconds]
UM_Model_04.Source0.System_Attributes[ 6] = WORKED_Entity_Produce_Time at Output_Channel[1]
31.0877193 [seconds/entity]

```

```

UM_Model_04.Source0.First_Calculation? =False

```

```

UM_Model_04.Source0.Capacity =1
UM_Model_04.Source0.Number_Of_Content_Entities =1
UM_Model_04.Source0.Content_Entities_Vector[ 0] =#194

```

```

UM_Model_04.Source0.OutputChannel_Index_Selection_Strategy =TSelection_Random_Selected_Index
UM_Model_04.Source0.OutputChannel_Index =0

```

```

UM_Model_04.Source0.Number_Of_OutputChannels =6

```

```

UM_Model_04.Source0.Output [ 0].Data =#Rekesz_01_(#186)
UM_Model_04.Source0.Output [ 0].Channel_Is_Enabled =True
UM_Model_04.Source0.Output [ 0].Channel_Is_Connected =True    (#_of_Entities= 10)

```

```

UM_Model_04.Source0.Output [ 1].Data =#Rekesz_01_(#193)
UM_Model_04.Source0.Output [ 1].Channel_Is_Enabled =True
UM_Model_04.Source0.Output [ 1].Channel_Is_Connected =True    (#_of_Entities= 57)

```

```

UM_Model_04.Source0.Output [ 2].Data =#Empty
UM_Model_04.Source0.Output [ 2].Channel_Is_Enabled =True
UM_Model_04.Source0.Output [ 2].Channel_Is_Connected =False    (#_of_Entities= 0)

```

```

UM_Model_04.Source0.Output [ 3].Data =#Empty
UM_Model_04.Source0.Output [ 3].Channel_Is_Enabled =True

```

```
UM_Model_04.Source0.Output [ 3].Channel_Is_Connected =False    (#_of_Entities= 0)
```

```
UM_Model_04.Source0.Output [ 4].Data =#Empty
```

```
UM_Model_04.Source0.Output [ 4].Channel_Is_Enabled =True
```

```
UM_Model_04.Source0.Output [ 4].Channel_Is_Connected =False    (#_of_Entities= 0)
```

```
UM_Model_04.Source0.Output [ 5].Data =#Empty
```

```
UM_Model_04.Source0.Output [ 5].Channel_Is_Enabled =True
```

```
UM_Model_04.Source0.Output [ 5].Channel_Is_Connected =False    (#_of_Entities= 0)
```

```
*****
```

```
TSOURCE_end_TSOURCE_end_TSOURCE_end_TSOURCE_end_TSOURCE_end_TSOURCE_end_TSOURCE_
```

```
-----
```

```
#####
```

```
#####
```

```
UM_Model_04.DESBranch_DESObjectList[    2]
```

```
*****
```

```
TSOURCE_start_TSOURCE_start_TSOURCE_start_TSOURCE_start_TSOURCE_start_TSOURCE_
```

```
+++++
```

```
UM_Model_04.Source1.SOURCE_Created_Entity.Name_str =Rekesz_02
```

```
UM_Model_04.Source1.SOURCE_Time_Of_Next_Launching = 0:00:30:30.000
```

```
UM_Model_04.Source1.SOURCE_Time_Step = 0:00:01:01.000
```

```
UM_Model_04.Source1.SOURCE_Distribution =TDistribution_Constant_Value
```

```
UM_Model_04.Source1.SOURCE_Constant_Value_Of_Time = 0:00:01:01.000
```

```
UM_Model_04.Source1.SOURCE_Mean_Of_Time = 0:00:00:01.000
```

```
UM_Model_04.Source1.SOURCE_Deviation_Of_Time = 0:00:00:01.000
```

```
UM_Model_04.Source1.SOURCE_Maximum_Of_Time = 0:00:00:03.000
```

```
UM_Model_04.Source1.SOURCE_Usual_Of_Time = 0:00:00:02.000
```

```
UM_Model_04.Source1.SOURCE_Minimum_Of_Time = 0:00:00:01.000
```

```

UM_Model_04.Source1.SOURCE_Maximum_Batch_Size =2000000000
UM_Model_04.Source1.SOURCE_Number_Of_Created_Objects =10

UM_Model_04.Source1.SOURCE_Last_Calculation_Time = 0:00:29:29.000
.....

UM_Model_04.Source1.DESObject_Owner_class =<TDES_BRANCH.TDES_BRANCH object at 0x0000022D10CBCC70> (UM_Model_04)

UM_Model_04.Source1.DESObject_Name_str =Source1
UM_Model_04.Source1.DESObject_ID_Number =15
UM_Model_04.Source1.DESObject_Type =TSOURCE

UM_Model_04.Source1.DESObject_Priority_To_DESEntity_From_DESObject =0
UM_Model_04.Source1.DESBranch_Name_str =UM_Model_04

UM_Model_04.Source1.DESObject_Commanded_State_In_Previous_Step =TCommanded_Enabled_State
UM_Model_04.Source1.DESObject_Commanded_State =TCommanded_Enabled_State

UM_Model_04.Source1.DESObject_Work_State =TIdle
UM_Model_04.Source1.DESObject_Work_State_In_Previous_Step =TIdle
UM_Model_04.Source1.DESObject_Work_State_Before_Fail_Or_Pause =TIdle

UM_Model_04.Source1.Time_Percent_In_Statuses[ TIdle] = 63.333
UM_Model_04.Source1.Time_Percent_In_Statuses[ TBusy] = 0.000
UM_Model_04.Source1.Time_Percent_In_Statuses[TBlocked] = 36.667
UM_Model_04.Source1.Time_Percent_In_Statuses[ TFailed] = 0.000
UM_Model_04.Source1.Time_Percent_In_Statuses[ TPaused] = 0.000

UM_Model_04.Source1.System_Attributes[ i] = Name
Value
UM_Model_04.Source1.System_Attributes[ 0] = WORKED_Entity_Sample_Number
UM_Model_04.Source1.System_Attributes[ 1] = WORKED_Entity_Sample_Summa
671.0
UM_Model_04.Source1.System_Attributes[ 2] = WORKED_Entity_Average_Staying_Time_in_DESObject
0:00:01:01.000
UM_Model_04.Source1.System_Attributes[ 3] = WORKED_Entity_Through_Output_Rate at Output_Channel[0]
0.0056529 [entity/seconds]

```

```
UM_Model_04.Source1.System_Attributes[ 4] = WORKED_Entity_Produce_Time at Output_Channel[0]
176.9000000 [seconds/entity]
```

```
UM_Model_04.Source1.First_Calculation? =False
```

```
UM_Model_04.Source1.Capacity =1
UM_Model_04.Source1.Number_Of_Content_Entities =0
```

```
UM_Model_04.Source1.OutputChannel_Index_Selection_Strategy =TSelection_Random_Selected_Index
UM_Model_04.Source1.OutputChannel_Index =0
```

```
UM_Model_04.Source1.Number_Of_OutputChannels =6
```

```
UM_Model_04.Source1.Output [ 0].Data =#Rekesz_02_(#191)
UM_Model_04.Source1.Output [ 0].Channel_Is_Enabled =True
UM_Model_04.Source1.Output [ 0].Channel_Is_Connected =True    (#_of_Entities= 10)
```

```
UM_Model_04.Source1.Output [ 1].Data =#Empty
UM_Model_04.Source1.Output [ 1].Channel_Is_Enabled =True
UM_Model_04.Source1.Output [ 1].Channel_Is_Connected =False    (#_of_Entities= 0)
```

```
UM_Model_04.Source1.Output [ 2].Data =#Empty
UM_Model_04.Source1.Output [ 2].Channel_Is_Enabled =True
UM_Model_04.Source1.Output [ 2].Channel_Is_Connected =False    (#_of_Entities= 0)
```

```
UM_Model_04.Source1.Output [ 3].Data =#Empty
UM_Model_04.Source1.Output [ 3].Channel_Is_Enabled =True
UM_Model_04.Source1.Output [ 3].Channel_Is_Connected =False    (#_of_Entities= 0)
```

```
UM_Model_04.Source1.Output [ 4].Data =#Empty
UM_Model_04.Source1.Output [ 4].Channel_Is_Enabled =True
UM_Model_04.Source1.Output [ 4].Channel_Is_Connected =False    (#_of_Entities= 0)
```

```
UM_Model_04.Source1.Output [ 5].Data =#Empty
UM_Model_04.Source1.Output [ 5].Channel_Is_Enabled =True
UM_Model_04.Source1.Output [ 5].Channel_Is_Connected =False    (#_of_Entities= 0)
```

```
*****
```


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UM_Model_04.DESBranch_DESObjectList[3]

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+++++

UM_Model_04.Source2.SOURCE_Created_Entity.Name_str =Rekesz_03

UM_Model_04.Source2.SOURCE_Time_Of_Next_Launching = 0:00:28:28.000

UM_Model_04.Source2.SOURCE_Time_Step = 0:00:01:01.000

UM_Model_04.Source2.SOURCE_Distribution =TDistribution_Constant_Value

UM_Model_04.Source2.SOURCE_Constant_Value_Of_Time = 0:00:01:01.000

UM_Model_04.Source2.SOURCE_Mean_Of_Time = 0:00:00:01.000

UM_Model_04.Source2.SOURCE_Deviation_Of_Time = 0:00:00:01.000

UM_Model_04.Source2.SOURCE_Maximum_Of_Time = 0:00:00:03.000

UM_Model_04.Source2.SOURCE_Usual_Of_Time = 0:00:00:02.000

UM_Model_04.Source2.SOURCE_Minimum_Of_Time = 0:00:00:01.000

UM_Model_04.Source2.SOURCE_Maximum_Batch_Size =2000000000

UM_Model_04.Source2.SOURCE_Number_Of_Created_Objects =19

UM_Model_04.Source2.SOURCE_Last_Calculation_Time = 0:00:29:29.000

.....

UM_Model_04.Source2.DESObject_Owner_class =<TDES_BRANCH.TDES_BRANCH object at 0x0000022D10CBCC70> (UM_Model_04)

UM_Model_04.Source2.DESObject_Name_str =Source2

UM_Model_04.Source2.DESObject_ID_Number =17

```
UM_Model_04.Source2.DESObject_Type =TSOURCE
```

```
UM_Model_04.Source2.DESObject_Priority_To_DESEntity_From_DESObject =0
```

```
UM_Model_04.Source2.DESBranch_Name_str =UM_Model_04
```

```
UM_Model_04.Source2.DESObject_Commanded_State_In_Previous_Step =TCommanded_Enabled_State
```

```
UM_Model_04.Source2.DESObject_Commanded_State =TCommanded_Enabled_State
```

```
UM_Model_04.Source2.DESObject_Work_State =TBlocked
```

```
UM_Model_04.Source2.DESObject_Work_State_In_Previous_Step =TBlocked
```

```
UM_Model_04.Source2.DESObject_Work_State_Before_Fail_Or_Pause =TBlocked
```

```
UM_Model_04.Source2.Time_Percent_In_Statuses[ TIdle] = 53.333
```

```
UM_Model_04.Source2.Time_Percent_In_Statuses[ TBusy] = 0.000
```

```
UM_Model_04.Source2.Time_Percent_In_Statuses[TBlocked] = 46.667
```

```
UM_Model_04.Source2.Time_Percent_In_Statuses[ TFailed] = 0.000
```

```
UM_Model_04.Source2.Time_Percent_In_Statuses[ TPaused] = 0.000
```

```
UM_Model_04.Source2.System_Attributes[ i] = Name  
Value
```

```
UM_Model_04.Source2.System_Attributes[ 0] = WORKED_Entity_Sample_Number
```

19

```
UM_Model_04.Source2.System_Attributes[ 1] = WORKED_Entity_Sample_Summa  
793.0
```

```
UM_Model_04.Source2.System_Attributes[ 2] = WORKED_Entity_Average_Staying_Time_in_DESObject  
0:00:00:41.737
```

```
UM_Model_04.Source2.System_Attributes[ 3] = WORKED_Entity_Through_Output_Rate at Output_Channel[0]  
0.0101752 [entity/seconds]
```

```
UM_Model_04.Source2.System_Attributes[ 4] = WORKED_Entity_Produce_Time at Output_Channel[0]  
98.2777778 [seconds/entity]
```

```
UM_Model_04.Source2.First_Calculation? =False
```

```
UM_Model_04.Source2.Capacity =1
```

```
UM_Model_04.Source2.Number_Of_Content_Entities =0
```

```
UM_Model_04.Source2.OutputChannel_Index_Selection_Strategy =TSelection_Random_Selected_Index
```

```
UM_Model_04.Source2.OutputChannel_Index =0
```

```
UM_Model_04.Source2.Number_Of_OutputChannels =6
```

```
UM_Model_04.Source2.Output [ 0].Data =#Empty
UM_Model_04.Source2.Output [ 0].Channel_Is_Enabled =True
UM_Model_04.Source2.Output [ 0].Channel_Is_Connected =True    (#_of_Entities= 19)
```

```
UM_Model_04.Source2.Output [ 1].Data =#Empty
UM_Model_04.Source2.Output [ 1].Channel_Is_Enabled =True
UM_Model_04.Source2.Output [ 1].Channel_Is_Connected =False    (#_of_Entities= 0)
```

```
UM_Model_04.Source2.Output [ 2].Data =#Empty
UM_Model_04.Source2.Output [ 2].Channel_Is_Enabled =True
UM_Model_04.Source2.Output [ 2].Channel_Is_Connected =False    (#_of_Entities= 0)
```

```
UM_Model_04.Source2.Output [ 3].Data =#Empty
UM_Model_04.Source2.Output [ 3].Channel_Is_Enabled =True
UM_Model_04.Source2.Output [ 3].Channel_Is_Connected =False    (#_of_Entities= 0)
```

```
UM_Model_04.Source2.Output [ 4].Data =#Empty
UM_Model_04.Source2.Output [ 4].Channel_Is_Enabled =True
UM_Model_04.Source2.Output [ 4].Channel_Is_Connected =False    (#_of_Entities= 0)
```

```
UM_Model_04.Source2.Output [ 5].Data =#Empty
UM_Model_04.Source2.Output [ 5].Channel_Is_Enabled =True
UM_Model_04.Source2.Output [ 5].Channel_Is_Connected =False    (#_of_Entities= 0)
```

```
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#####
UM_Model_04.DESBranch_DESObjectList[      4]
```

```
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TSOURCE_start_TSOURCE_start_TSOURCE_start_TSOURCE_start_TSOURCE_start_TSOURCE_
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+++++

UM_Model_04.Source3.SOURCE_Created_Entity.Name_str =Barack

UM_Model_04.Source3.SOURCE_Time_Of_Next_Launching = 0:00:28:28.000

UM_Model_04.Source3.SOURCE_Time_Step = 0:00:01:01.000

UM_Model_04.Source3.SOURCE_Distribution =TDistribution_Constant_Value

UM_Model_04.Source3.SOURCE_Constant_Value_Of_Time = 0:00:01:01.000

UM_Model_04.Source3.SOURCE_Mean_Of_Time = 0:00:00:01.000

UM_Model_04.Source3.SOURCE_Deviation_Of_Time = 0:00:00:01.000

UM_Model_04.Source3.SOURCE_Maximum_Of_Time = 0:00:00:03.000

UM_Model_04.Source3.SOURCE_Usual_Of_Time = 0:00:00:02.000

UM_Model_04.Source3.SOURCE_Minimum_Of_Time = 0:00:00:01.000

UM_Model_04.Source3.SOURCE_Maximum_Batch_Size =2000000000

UM_Model_04.Source3.SOURCE_Number_Of_Created_Objects =18

UM_Model_04.Source3.SOURCE_Last_Calculation_Time = 0:00:29:29.000

.....

UM_Model_04.Source3.DESObject_Owner_class =<TDES_BRANCH.TDES_BRANCH object at 0x0000022D10CBCC70> (UM_Model_04)

UM_Model_04.Source3.DESObject_Name_str =Source3

UM_Model_04.Source3.DESObject_ID_Number =19

UM_Model_04.Source3.DESObject_Type =TSOURCE

UM_Model_04.Source3.DESObject_Priority_To_DESEntity_From_DESObject =0

UM_Model_04.Source3.DESBranch_Name_str =UM_Model_04

UM_Model_04.Source3.DESObject_Commanded_State_In_Previous_Step =TCommanded_Enabled_State

UM_Model_04.Source3.DESObject_Commanded_State =TCommanded_Enabled_State

UM_Model_04.Source3.DESObject_Work_State =TBlocked

UM_Model_04.Source3.DESObject_Work_State_In_Previous_Step =TBlocked

UM_Model_04.Source3.DESObject_Work_State_Before_Fail_Or_Pause =TBlocked

```

UM_Model_04.Source3.Time_Percent_In_Statues[  TIdle] = 56.667
UM_Model_04.Source3.Time_Percent_In_Statues[  TBusy] =  0.000
UM_Model_04.Source3.Time_Percent_In_Statues[TBlocked] = 43.333
UM_Model_04.Source3.Time_Percent_In_Statues[ TFailed] =  0.000
UM_Model_04.Source3.Time_Percent_In_Statues[ TPaused] =  0.000

UM_Model_04.Source3.System_Attributes[  i] = Name
Value
UM_Model_04.Source3.System_Attributes[  0] = WORKED_Entity_Sample_Number
UM_Model_04.Source3.System_Attributes[  1] = WORKED_Entity_Sample_Summa
732.0
UM_Model_04.Source3.System_Attributes[  2] = WORKED_Entity_Average_Staying_Time_in_DESObject
0:00:00:40.667
UM_Model_04.Source3.System_Attributes[  3] = WORKED_Entity_Through_Output_Rate at Output_Channel[0]
0.0096099 [entity/seconds]
UM_Model_04.Source3.System_Attributes[  4] = WORKED_Entity_Produce_Time at Output_Channel[0]
104.0588235 [seconds/entity]

UM_Model_04.Source3.First_Calculation? =False

UM_Model_04.Source3.Capacity =1
UM_Model_04.Source3.Number_Of_Content_Entities =0

UM_Model_04.Source3.OutputChannel_Index_Selection_Strategy =TSelection_Random_Selected_Index
UM_Model_04.Source3.OutputChannel_Index =0

UM_Model_04.Source3.Number_Of_OutputChannels =6

UM_Model_04.Source3.Output [ 0].Data =#Empty
UM_Model_04.Source3.Output [ 0].Channel_Is_Enabled =True
UM_Model_04.Source3.Output [ 0].Channel_Is_Connected =True    (#_of_Entities= 18)

UM_Model_04.Source3.Output [ 1].Data =#Empty
UM_Model_04.Source3.Output [ 1].Channel_Is_Enabled =True
UM_Model_04.Source3.Output [ 1].Channel_Is_Connected =False    (#_of_Entities= 0)

UM_Model_04.Source3.Output [ 2].Data =#Empty
UM_Model_04.Source3.Output [ 2].Channel_Is_Enabled =True

```

```
UM_Model_04.Source3.Output [ 2].Channel_Is_Connected =False    (#_of_Entities= 0)
```

```
UM_Model_04.Source3.Output [ 3].Data =#Empty
```

```
UM_Model_04.Source3.Output [ 3].Channel_Is_Enabled =True
```

```
UM_Model_04.Source3.Output [ 3].Channel_Is_Connected =False    (#_of_Entities= 0)
```

```
UM_Model_04.Source3.Output [ 4].Data =#Empty
```

```
UM_Model_04.Source3.Output [ 4].Channel_Is_Enabled =True
```

```
UM_Model_04.Source3.Output [ 4].Channel_Is_Connected =False    (#_of_Entities= 0)
```

```
UM_Model_04.Source3.Output [ 5].Data =#Empty
```

```
UM_Model_04.Source3.Output [ 5].Channel_Is_Enabled =True
```

```
UM_Model_04.Source3.Output [ 5].Channel_Is_Connected =False    (#_of_Entities= 0)
```

```
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```

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TSOURCE_end_TSOURCE_end_TSOURCE_end_TSOURCE_end_TSOURCE_end_TSOURCE_end_TSOURCE_
```

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```

```
UM_Model_04.DESBranch_DESObjectList[    5]
```

```
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```

```
TSOURCE_start_TSOURCE_start_TSOURCE_start_TSOURCE_start_TSOURCE_start_TSOURCE_
```

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```

```
UM_Model_04.Source4.SOURCE_Created_Entity.Name_str =Alma
```

```
UM_Model_04.Source4.SOURCE_Time_Of_Next_Launching = 0:00:30:30.000
```

```
UM_Model_04.Source4.SOURCE_Time_Step = 0:00:01:01.000
```

```
UM_Model_04.Source4.SOURCE_Distribution =TDistribution_Constant_Value
```

```
UM_Model_04.Source4.SOURCE_Constant_Value_Of_Time = 0:00:01:01.000
```

```
UM_Model_04.Source4.SOURCE_Mean_Of_Time = 0:00:00:01.000
```

```
UM_Model_04.Source4.SOURCE_Deviation_Of_Time = 0:00:00:01.000
```

```

UM_Model_04.Source4.SOURCE_Maximum_Of_Time = 0:00:00:03.000
UM_Model_04.Source4.SOURCE_Usual_Of_Time = 0:00:00:02.000
UM_Model_04.Source4.SOURCE_Minimum_Of_Time = 0:00:00:01.000

```

```

UM_Model_04.Source4.SOURCE_Maximum_Batch_Size =20000000000
UM_Model_04.Source4.SOURCE_Number_Of_Created_Objects =29

```

```

UM_Model_04.Source4.SOURCE_Last_Calculation_Time = 0:00:30:30.000

```

```

.....

```

```

UM_Model_04.Source4.DESObject_Owner_class =<TDES_BRANCH.TDES_BRANCH object at 0x0000022D10CBCC70> (UM_Model_04)

```

```

UM_Model_04.Source4.DESObject_Name_str =Source4
UM_Model_04.Source4.DESObject_ID_Number =21
UM_Model_04.Source4.DESObject_Type =TSOURCE

```

```

UM_Model_04.Source4.DESObject_Priority_To_DESEntity_From_DESObject =0
UM_Model_04.Source4.DESBranch_Name_str =UM_Model_04

```

```

UM_Model_04.Source4.DESObject_Commanded_State_In_Previous_Step =TCommanded_Enabled_State
UM_Model_04.Source4.DESObject_Commanded_State =TCommanded_Enabled_State

```

```

UM_Model_04.Source4.DESObject_Work_State =TBlocked
UM_Model_04.Source4.DESObject_Work_State_In_Previous_Step =TBlocked
UM_Model_04.Source4.DESObject_Work_State_Before_Fail_Or_Pause =TBlocked

```

```

UM_Model_04.Source4.Time_Percent_In_Statuses[ TIdle] = 6.667
UM_Model_04.Source4.Time_Percent_In_Statuses[ TBusy] = 0.000
UM_Model_04.Source4.Time_Percent_In_Statuses[TBlocked] = 93.333
UM_Model_04.Source4.Time_Percent_In_Statuses[ TFailed] = 0.000
UM_Model_04.Source4.Time_Percent_In_Statuses[ TPaused] = 0.000

```

```

UM_Model_04.Source4.System_Attributes[ i] = Name
Value

```

```

UM_Model_04.Source4.System_Attributes[ 0] = WORKED_Entity_Sample_Number
UM_Model_04.Source4.System_Attributes[ 1] = WORKED_Entity_Sample_Summa
1708.0

```

```

UM_Model_04.Source4.System_Attributes[ 2] = WORKED_Entity_Average_Staying_Time_in_DESObject
0:00:00:56.933
UM_Model_04.Source4.System_Attributes[ 3] = WORKED_Entity_Through_Output_Rate at Output_Channel[0]
0.0158470 [entity/seconds]
UM_Model_04.Source4.System_Attributes[ 4] = WORKED_Entity_Produce_Time at Output_Channel[0]
63.1034483 [seconds/entity]

UM_Model_04.Source4.First_Calculation? =False

UM_Model_04.Source4.Capacity =1
UM_Model_04.Source4.Number_Of_Content_Entities =0

UM_Model_04.Source4.OutputChannel_Index_Selection_Strategy =TSelection_Random_Selected_Index
UM_Model_04.Source4.OutputChannel_Index =0

UM_Model_04.Source4.Number_Of_OutputChannels =6

UM_Model_04.Source4.Output [ 0].Data =#Alma_ (#190)
UM_Model_04.Source4.Output [ 0].Channel_Is_Enabled =True
UM_Model_04.Source4.Output [ 0].Channel_Is_Connected =True (#_of_Entities= 29)

UM_Model_04.Source4.Output [ 1].Data =#Empty
UM_Model_04.Source4.Output [ 1].Channel_Is_Enabled =True
UM_Model_04.Source4.Output [ 1].Channel_Is_Connected =False (#_of_Entities= 0)

UM_Model_04.Source4.Output [ 2].Data =#Empty
UM_Model_04.Source4.Output [ 2].Channel_Is_Enabled =True
UM_Model_04.Source4.Output [ 2].Channel_Is_Connected =False (#_of_Entities= 0)

UM_Model_04.Source4.Output [ 3].Data =#Empty
UM_Model_04.Source4.Output [ 3].Channel_Is_Enabled =True
UM_Model_04.Source4.Output [ 3].Channel_Is_Connected =False (#_of_Entities= 0)

UM_Model_04.Source4.Output [ 4].Data =#Empty
UM_Model_04.Source4.Output [ 4].Channel_Is_Enabled =True
UM_Model_04.Source4.Output [ 4].Channel_Is_Connected =False (#_of_Entities= 0)

UM_Model_04.Source4.Output [ 5].Data =#Empty

```



```
UM_Model_04.Source4.Output [ 5].Channel_Is_Enabled =True
UM_Model_04.Source4.Output [ 5].Channel_Is_Connected =False    (#_of_Entities= 0)

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UM_Model_04.DESBranch_DESObjectList[      6]

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+++++++

UM_Model_04.Wrapper01.WRAPPER_Step_Sequence =TWrapper_Waiting_for_Sending_Away_Packed_Entities
UM_Model_04.Wrapper01.WRAPPER_Type_Of_Queue =TQueue_First_In_First_Out

UM_Model_04.Wrapper01.WRAPPER_Entity_Request_At_Channel[0] =1
UM_Model_04.Wrapper01.WRAPPER_Entity_Amount_At_Channel[ 0] =0

UM_Model_04.Wrapper01.WRAPPER_Entity_Request_At_Channel[1] =1
UM_Model_04.Wrapper01.WRAPPER_Entity_Amount_At_Channel[ 1] =1

UM_Model_04.Wrapper01.WRAPPER_Entity_Request_At_Channel[2] =0
UM_Model_04.Wrapper01.WRAPPER_Entity_Amount_At_Channel[ 2] =0

UM_Model_04.Wrapper01.WRAPPER_Entity_Request_At_Channel[3] =0
UM_Model_04.Wrapper01.WRAPPER_Entity_Amount_At_Channel[ 3] =0

UM_Model_04.Wrapper01.WRAPPER_Entity_Request_At_Channel[4] =0
UM_Model_04.Wrapper01.WRAPPER_Entity_Amount_At_Channel[ 4] =0

UM_Model_04.Wrapper01.WRAPPER_Entity_Request_At_Channel[5] =0
UM_Model_04.Wrapper01.WRAPPER_Entity_Amount_At_Channel[ 5] =0
```

```

UM_Model_04.Wrapper01.WRAPPER_Last_Calculation_Time = 0:00:28:28.000
.....

UM_Model_04.Wrapper01.DESObject_Owner_class =<TDES_BRANCH.TDES_BRANCH object at 0x0000022D10CBCC70>
(UM_Model_04)

UM_Model_04.Wrapper01.DESObject_Name_str =Wrapper01
UM_Model_04.Wrapper01.DESObject_ID_Number =23
UM_Model_04.Wrapper01.DESObject_Type =TWRAPPER

UM_Model_04.Wrapper01.DESObject_Priority_To_DESEntity_From_DESObject =0
UM_Model_04.Wrapper01.DESBranch_Name_str =UM_Model_04

UM_Model_04.Wrapper01.DESObject_Commanded_State_In_Previous_Step =TCommanded_Enabled_State
UM_Model_04.Wrapper01.DESObject_Commanded_State =TCommanded_Enabled_State

UM_Model_04.Wrapper01.DESObject_Work_State =TBlocked
UM_Model_04.Wrapper01.DESObject_Work_State_In_Previous_Step =TBlocked
UM_Model_04.Wrapper01.DESObject_Work_State_Before_Fail_Or_Pause =TBlocked

UM_Model_04.Wrapper01.Time_Percent_In_Statuses[ TIdle] = 0.000
UM_Model_04.Wrapper01.Time_Percent_In_Statuses[ TBusy] = 6.557
UM_Model_04.Wrapper01.Time_Percent_In_Statuses[TBlocked] = 93.443
UM_Model_04.Wrapper01.Time_Percent_In_Statuses[ TFailed] = 0.000
UM_Model_04.Wrapper01.Time_Percent_In_Statuses[ TPaused] = 0.000

UM_Model_04.Wrapper01.System_Attributes[ i] = Name
Value
UM_Model_04.Wrapper01.System_Attributes[ 0] = WORKED_Entity_Sample_Number
10
UM_Model_04.Wrapper01.System_Attributes[ 1] = WORKED_Entity_Sample_Summa
0.0
UM_Model_04.Wrapper01.System_Attributes[ 2] = WORKED_Entity_Average_Staying_Time_in_DESObject
0:00:00:00.000
UM_Model_04.Wrapper01.System_Attributes[ 3] = WORKED_Entity_Through_Output_Rate at Output_Channel[0]
0.0052693 [entity/seconds]

```

```
UM_Model_04.Wrapper01.System_Attributes[ 4] = WORKED_Entity_Produce_Time at Output_Channel[0]
189.7777778 [seconds/entity]

UM_Model_04.Wrapper01.First_Calculation? =False

UM_Model_04.Wrapper01.InputChannel_Index_Selection_Strategy =TSelection_Random_Selected_Index
UM_Model_04.Wrapper01.InputChannel_Index =5

UM_Model_04.Wrapper01.Number_Of_InputChannels =6

UM_Model_04.Wrapper01.Input [ 0].Data =#Empty
UM_Model_04.Wrapper01.Input [ 0].Channel_Is_Enabled =False
UM_Model_04.Wrapper01.Input [ 0].Channel_Is_Connected =True      (#_of_Entities= 10)

UM_Model_04.Wrapper01.Input [ 1].Data =#Empty
UM_Model_04.Wrapper01.Input [ 1].Channel_Is_Enabled =False
UM_Model_04.Wrapper01.Input [ 1].Channel_Is_Connected =True      (#_of_Entities= 10)

UM_Model_04.Wrapper01.Input [ 2].Data =#Empty
UM_Model_04.Wrapper01.Input [ 2].Channel_Is_Enabled =False
UM_Model_04.Wrapper01.Input [ 2].Channel_Is_Connected =False      (#_of_Entities= 0)

UM_Model_04.Wrapper01.Input [ 3].Data =#Empty
UM_Model_04.Wrapper01.Input [ 3].Channel_Is_Enabled =False
UM_Model_04.Wrapper01.Input [ 3].Channel_Is_Connected =False      (#_of_Entities= 0)

UM_Model_04.Wrapper01.Input [ 4].Data =#Empty
UM_Model_04.Wrapper01.Input [ 4].Channel_Is_Enabled =False
UM_Model_04.Wrapper01.Input [ 4].Channel_Is_Connected =False      (#_of_Entities= 0)

UM_Model_04.Wrapper01.Input [ 5].Data =#Empty
UM_Model_04.Wrapper01.Input [ 5].Channel_Is_Enabled =False
UM_Model_04.Wrapper01.Input [ 5].Channel_Is_Connected =False      (#_of_Entities= 0)

UM_Model_04.Wrapper01.Capacity =1
UM_Model_04.Wrapper01.Number_Of_Content_Entities =0

UM_Model_04.Wrapper01.OutputChannel_Index_Selection_Strategy =TSelection_Random_Selected_Index
```

```
UM_Model_04.Wrapper01.OutputChannel_Index =0
```

```
UM_Model_04.Wrapper01.Number_Of_OutputChannels =1
```

```
UM_Model_04.Wrapper01.Output [ 0].Data =#Rekesz_02_(#163)
```

```
UM_Model_04.Wrapper01.Output [ 0].Channel_Is_Enabled =True
```

```
UM_Model_04.Wrapper01.Output [ 0].Channel_Is_Connected =True    (#_of_Entities= 9)
```

```
*****
```

```
TWRAPPER_end_TWRAPPER_end_TWRAPPER_end_TWRAPPER_end_TWRAPPER_end_TWRAPPER_end_
```

```
-----
```

```
#####
```

```
#####
```

```
UM_Model_04.DESBranch_DESObjectList[    7]
```

```
*****
```

```
TWRAPPER_start_TWRAPPER_start_TWRAPPER_start_TWRAPPER_start_TWRAPPER_start_TWRAP
```

```
+++++
```

```
UM_Model_04.Wrapper02.WRAPPER_Step_Sequence =TWrapper_Waiting_for_Sending_Away_Packed_Entities
```

```
UM_Model_04.Wrapper02.WRAPPER_Type_Of_Queue =TQueue_First_In_First_Out
```

```
UM_Model_04.Wrapper02.WRAPPER_Entity_Request_At_Channel[0] =1
```

```
UM_Model_04.Wrapper02.WRAPPER_Entity_Amount_At_Channel[ 0] =0
```

```
UM_Model_04.Wrapper02.WRAPPER_Entity_Request_At_Channel[1] =2
```

```
UM_Model_04.Wrapper02.WRAPPER_Entity_Amount_At_Channel[ 1] =2
```

```
UM_Model_04.Wrapper02.WRAPPER_Entity_Request_At_Channel[2] =2
```

```
UM_Model_04.Wrapper02.WRAPPER_Entity_Amount_At_Channel[ 2] =2
```

```
UM_Model_04.Wrapper02.WRAPPER_Entity_Request_At_Channel[3] =0
```

```
UM_Model_04.Wrapper02.WRAPPER_Entity_Amount_At_Channel[ 3] =0
```

```
UM_Model_04.Wrapper02.WRAPPER_Entity_Request_At_Channel[4] =0
```

```

UM_Model_04.Wrapper02.WRAPPER_Entity_Amount_At_Channel[ 4] =0

UM_Model_04.Wrapper02.WRAPPER_Entity_Request_At_Channel[5] =0
UM_Model_04.Wrapper02.WRAPPER_Entity_Amount_At_Channel[ 5] =0


UM_Model_04.Wrapper02.WRAPPER_Last_Calculation_Time =  0:00:29:29.000
.....

UM_Model_04.Wrapper02.DESObject_Owner_class =<TDES_BRANCH.TDES_BRANCH object at 0x0000022D10CBCC70>
(UM_Model_04)

UM_Model_04.Wrapper02.DESObject_Name_str =Wrapper02
UM_Model_04.Wrapper02.DESObject_ID_Number =24
UM_Model_04.Wrapper02.DESObject_Type =TWRAPPER

UM_Model_04.Wrapper02.DESObject_Priority_To_DESEntity_From_DESObject =0
UM_Model_04.Wrapper02.DESBranch_Name_str =UM_Model_04

UM_Model_04.Wrapper02.DESObject_Commanded_State_In_Previous_Step =TCommanded_Enabled_State
UM_Model_04.Wrapper02.DESObject_Commanded_State =TCommanded_Enabled_State

UM_Model_04.Wrapper02.DESObject_Work_State =TBlocked
UM_Model_04.Wrapper02.DESObject_Work_State_In_Previous_Step =TBlocked
UM_Model_04.Wrapper02.DESObject_Work_State_Before_Fail_Or_Pause =TBlocked

UM_Model_04.Wrapper02.Time_Percent_In_Statuses[  TIdle] =  0.000
UM_Model_04.Wrapper02.Time_Percent_In_Statuses[  TBusy] = 33.552
UM_Model_04.Wrapper02.Time_Percent_In_Statuses[TBlocked] = 66.448
UM_Model_04.Wrapper02.Time_Percent_In_Statuses[ TFailed] =  0.000
UM_Model_04.Wrapper02.Time_Percent_In_Statuses[ TPaused] =  0.000

UM_Model_04.Wrapper02.System_Attributes[  i] = Name
Value
UM_Model_04.Wrapper02.System_Attributes[  0] = WORKED_Entity_Sample_Number
UM_Model_04.Wrapper02.System_Attributes[  1] = WORKED_Entity_Sample_Summa
614.0

```

```

UM_Model_04.Wrapper02.System_Attributes[ 2] = WORKED_Entity_Average_Staying_Time_in_DESObject
0:00:01:08.222
UM_Model_04.Wrapper02.System_Attributes[ 3] = WORKED_Entity_Through_Output_Rate at Output_Channel[0]
0.0045223 [entity/seconds]
UM_Model_04.Wrapper02.System_Attributes[ 4] = WORKED_Entity_Produce_Time at Output_Channel[0]
221.1250000 [seconds/entity]

UM_Model_04.Wrapper02.First_Calculation? =False

UM_Model_04.Wrapper02.InputChannel_Index_Selection_Strategy =TSelection_Random_Selected_Index
UM_Model_04.Wrapper02.InputChannel_Index =5

UM_Model_04.Wrapper02.Number_Of_InputChannels =6

UM_Model_04.Wrapper02.Input [ 0].Data =#Empty
UM_Model_04.Wrapper02.Input [ 0].Channel_Is_Enabled =False
UM_Model_04.Wrapper02.Input [ 0].Channel_Is_Connected =True      (#_of_Entities= 9)

UM_Model_04.Wrapper02.Input [ 1].Data =#Empty
UM_Model_04.Wrapper02.Input [ 1].Channel_Is_Enabled =False
UM_Model_04.Wrapper02.Input [ 1].Channel_Is_Connected =True      (#_of_Entities= 18)

UM_Model_04.Wrapper02.Input [ 2].Data =#Empty
UM_Model_04.Wrapper02.Input [ 2].Channel_Is_Enabled =False
UM_Model_04.Wrapper02.Input [ 2].Channel_Is_Connected =True      (#_of_Entities= 18)

UM_Model_04.Wrapper02.Input [ 3].Data =#Empty
UM_Model_04.Wrapper02.Input [ 3].Channel_Is_Enabled =False
UM_Model_04.Wrapper02.Input [ 3].Channel_Is_Connected =False      (#_of_Entities= 0)

UM_Model_04.Wrapper02.Input [ 4].Data =#Empty
UM_Model_04.Wrapper02.Input [ 4].Channel_Is_Enabled =False
UM_Model_04.Wrapper02.Input [ 4].Channel_Is_Connected =False      (#_of_Entities= 0)

UM_Model_04.Wrapper02.Input [ 5].Data =#Empty
UM_Model_04.Wrapper02.Input [ 5].Channel_Is_Enabled =False
UM_Model_04.Wrapper02.Input [ 5].Channel_Is_Connected =False      (#_of_Entities= 0)

```

```

UM_Model_04.Wrapper02.Capacity =1
UM_Model_04.Wrapper02.Number_Of_Content_Entities =0

UM_Model_04.Wrapper02.OutputChannel_Index_Selection_Strategy =TSelection_Random_Selected_Index
UM_Model_04.Wrapper02.OutputChannel_Index =0

UM_Model_04.Wrapper02.Number_Of_OutputChannels =1

UM_Model_04.Wrapper02.Output [ 0].Data =#Rekesz_02_(#159)
UM_Model_04.Wrapper02.Output [ 0].Channel_Is_Enabled =True
UM_Model_04.Wrapper02.Output [ 0].Channel_Is_Connected =True      (#_of_Entities= 8)

*****
TWRAPPER_end_TWRAPPER_end_TWRAPPER_end_TWRAPPER_end_TWRAPPER_end_TWRAPPER_end_
-----

#####
#####
UM_Model_04.DESBranch_DESObjectList[      8]

*****
TWRAPPER_start_TWRAPPER_start_TWRAPPER_start_TWRAPPER_start_TWRAPPER_start_TWRAP
+++++++

UM_Model_04.Wrapper03.WRAPPER_Step_Sequence =TWrapper_Waiting_for_Packing_Entities
UM_Model_04.Wrapper03.WRAPPER_Type_Of_Queue =TQueue_First_In_First_Out

UM_Model_04.Wrapper03.WRAPPER_Entity_Request_At_Channel[0] =1
UM_Model_04.Wrapper03.WRAPPER_Entity_Amount_At_Channel[ 0] =0

UM_Model_04.Wrapper03.WRAPPER_Entity_Request_At_Channel[1] =4
UM_Model_04.Wrapper03.WRAPPER_Entity_Amount_At_Channel[ 1] =1

UM_Model_04.Wrapper03.WRAPPER_Entity_Request_At_Channel[2] =0
UM_Model_04.Wrapper03.WRAPPER_Entity_Amount_At_Channel[ 2] =0

```

```

UM_Model_04.Wrapper03.WRAPPER_Entity_Request_At_Channel[3] =0
UM_Model_04.Wrapper03.WRAPPER_Entity_Amount_At_Channel[ 3] =0

UM_Model_04.Wrapper03.WRAPPER_Entity_Request_At_Channel[4] =0
UM_Model_04.Wrapper03.WRAPPER_Entity_Amount_At_Channel[ 4] =0

UM_Model_04.Wrapper03.WRAPPER_Entity_Request_At_Channel[5] =0
UM_Model_04.Wrapper03.WRAPPER_Entity_Amount_At_Channel[ 5] =0


UM_Model_04.Wrapper03.WRAPPER_Last_Calculation_Time =  0:00:29:29.000
.....

UM_Model_04.Wrapper03.DESObject_Owner_class =<TDES_BRANCH.TDES_BRANCH object at 0x0000022D10CBCC70>
(UM_Model_04)

UM_Model_04.Wrapper03.DESObject_Name_str =Wrapper03
UM_Model_04.Wrapper03.DESObject_ID_Number =25
UM_Model_04.Wrapper03.DESObject_Type =TWRAPPER

UM_Model_04.Wrapper03.DESObject_Priority_To_DESEntity_From_DESObject =0
UM_Model_04.Wrapper03.DESBranch_Name_str =UM_Model_04

UM_Model_04.Wrapper03.DESObject_Commanded_State_In_Previous_Step =TCommanded_Enabled_State
UM_Model_04.Wrapper03.DESObject_Commanded_State =TCommanded_Enabled_State

UM_Model_04.Wrapper03.DESObject_Work_State =TBusy
UM_Model_04.Wrapper03.DESObject_Work_State_In_Previous_Step =TBusy
UM_Model_04.Wrapper03.DESObject_Work_State_Before_Fail_Or_Pause =TBusy

UM_Model_04.Wrapper03.Time_Percent_In_Statuses[  TIdle] =  0.000
UM_Model_04.Wrapper03.Time_Percent_In_Statuses[  TBusy] =100.000
UM_Model_04.Wrapper03.Time_Percent_In_Statuses[TBlocked] =  0.000
UM_Model_04.Wrapper03.Time_Percent_In_Statuses[ TFailed] =  0.000
UM_Model_04.Wrapper03.Time_Percent_In_Statuses[ TPaused] =  0.000


UM_Model_04.Wrapper03.System_Attributes[  i] = Name
Value

```



```

UM_Model_04.Wrapper03.System_Attributes[ 0] = WORKED_Entity_Sample_Number
UM_Model_04.Wrapper03.System_Attributes[ 1] = WORKED_Entity_Sample_Summa
1645.0
UM_Model_04.Wrapper03.System_Attributes[ 2] = WORKED_Entity_Average_Staying_Time_in_DESObject
0:00:03:55.000
UM_Model_04.Wrapper03.System_Attributes[ 3] = WORKED_Entity_Through_Output_Rate at Output_Channel[0]
0.0035129 [entity/seconds]
UM_Model_04.Wrapper03.System_Attributes[ 4] = WORKED_Entity_Produce_Time at Output_Channel[0]
284.6666667 [seconds/entity]

```

```

UM_Model_04.Wrapper03.First_Calculation? =False

```

```

UM_Model_04.Wrapper03.InputChannel_Index_Selection_Strategy =TSelection_Random_Selected_Index
UM_Model_04.Wrapper03.InputChannel_Index =5

```

```

UM_Model_04.Wrapper03.Number_Of_InputChannels =6

```

```

UM_Model_04.Wrapper03.Input [ 0].Data =#Empty
UM_Model_04.Wrapper03.Input [ 0].Channel_Is_Enabled =False
UM_Model_04.Wrapper03.Input [ 0].Channel_Is_Connected =True    (#_of_Entities= 8)

```

```

UM_Model_04.Wrapper03.Input [ 1].Data =#Empty
UM_Model_04.Wrapper03.Input [ 1].Channel_Is_Enabled =True
UM_Model_04.Wrapper03.Input [ 1].Channel_Is_Connected =True    (#_of_Entities= 29)

```

```

UM_Model_04.Wrapper03.Input [ 2].Data =#Empty
UM_Model_04.Wrapper03.Input [ 2].Channel_Is_Enabled =False
UM_Model_04.Wrapper03.Input [ 2].Channel_Is_Connected =False    (#_of_Entities= 0)

```

```

UM_Model_04.Wrapper03.Input [ 3].Data =#Empty
UM_Model_04.Wrapper03.Input [ 3].Channel_Is_Enabled =False
UM_Model_04.Wrapper03.Input [ 3].Channel_Is_Connected =False    (#_of_Entities= 0)

```

```

UM_Model_04.Wrapper03.Input [ 4].Data =#Empty
UM_Model_04.Wrapper03.Input [ 4].Channel_Is_Enabled =False
UM_Model_04.Wrapper03.Input [ 4].Channel_Is_Connected =False    (#_of_Entities= 0)

```

```

UM_Model_04.Wrapper03.Input [ 5].Data =#Empty

```

```

UM_Model_04.Wrapper03.Input [ 5].Channel_Is_Enabled =False
UM_Model_04.Wrapper03.Input [ 5].Channel_Is_Connected =False    (#_of_Entities= 0)

UM_Model_04.Wrapper03.Capacity =1
UM_Model_04.Wrapper03.Number_Of_Content_Entities =1
UM_Model_04.Wrapper03.Content_Entities_Vector[ 0] =#131

UM_Model_04.Wrapper03.OutputChannel_Index_Selection_Strategy =TSelection_Random_Selected_Index
UM_Model_04.Wrapper03.OutputChannel_Index =0

UM_Model_04.Wrapper03.Number_Of_OutputChannels =1

UM_Model_04.Wrapper03.Output [ 0].Data =#Empty
UM_Model_04.Wrapper03.Output [ 0].Channel_Is_Enabled =False
UM_Model_04.Wrapper03.Output [ 0].Channel_Is_Connected =True    (#_of_Entities= 7)

*****
TWRAPPER_end_TWRAPPER_end_TWRAPPER_end_TWRAPPER_end_TWRAPPER_end_TWRAPPER_end_
-----

#####
#####
UM_Model_04.DESBranch_DESObjectList[ 9]

*****
TWRAPPER_start_TWRAPPER_start_TWRAPPER_start_TWRAPPER_start_TWRAPPER_start_TWRAP
+++++++

UM_Model_04.Wrapper11.WRAPPER_Step_Sequence =TWrapper_Waiting_for_Sending_Away_Packed_Entities
UM_Model_04.Wrapper11.WRAPPER_Type_Of_Queue =TQueue_First_In_First_Out

UM_Model_04.Wrapper11.WRAPPER_Entity_Request_At_Channel[0] =1
UM_Model_04.Wrapper11.WRAPPER_Entity_Amount_At_Channel[ 0] =0

UM_Model_04.Wrapper11.WRAPPER_Entity_Request_At_Channel[1] =3
UM_Model_04.Wrapper11.WRAPPER_Entity_Amount_At_Channel[ 1] =3

```

```
UM_Model_04.Wrapper11.WRAPPER_Entity_Request_At_Channel[2] =0
UM_Model_04.Wrapper11.WRAPPER_Entity_Amount_At_Channel[ 2] =0

UM_Model_04.Wrapper11.WRAPPER_Entity_Request_At_Channel[3] =0
UM_Model_04.Wrapper11.WRAPPER_Entity_Amount_At_Channel[ 3] =0

UM_Model_04.Wrapper11.WRAPPER_Entity_Request_At_Channel[4] =0
UM_Model_04.Wrapper11.WRAPPER_Entity_Amount_At_Channel[ 4] =0

UM_Model_04.Wrapper11.WRAPPER_Entity_Request_At_Channel[5] =0
UM_Model_04.Wrapper11.WRAPPER_Entity_Amount_At_Channel[ 5] =0


UM_Model_04.Wrapper11.WRAPPER_Last_Calculation_Time =  0:00:29:31.000
.....

UM_Model_04.Wrapper11.DESObject_Owner_class =<TDES_BRANCH.TDES_BRANCH object at 0x0000022D10CBCC70>
(UM_Model_04)

UM_Model_04.Wrapper11.DESObject_Name_str =Wrapper11
UM_Model_04.Wrapper11.DESObject_ID_Number =26
UM_Model_04.Wrapper11.DESObject_Type =TWRAPPER

UM_Model_04.Wrapper11.DESObject_Priority_To_DESEntity_From_DESObject =0
UM_Model_04.Wrapper11.DESBranch_Name_str =UM_Model_04

UM_Model_04.Wrapper11.DESObject_Commanded_State_In_Previous_Step =TCommanded_Enabled_State
UM_Model_04.Wrapper11.DESObject_Commanded_State =TCommanded_Enabled_State

UM_Model_04.Wrapper11.DESObject_Work_State =TBlocked
UM_Model_04.Wrapper11.DESObject_Work_State_In_Previous_Step =TBlocked
UM_Model_04.Wrapper11.DESObject_Work_State_Before_Fail_Or_Pause =TBlocked

UM_Model_04.Wrapper11.Time_Percent_In_Statuses[  TIdle] =  0.000
UM_Model_04.Wrapper11.Time_Percent_In_Statuses[  TBusy] = 40.765
UM_Model_04.Wrapper11.Time_Percent_In_Statuses[TBlocked] = 59.235
UM_Model_04.Wrapper11.Time_Percent_In_Statuses[ TFailed] =  0.000
```

```

UM_Model_04.Wrapper11.Time_Percent_In_Statuses[ TPaused] = 0.000

UM_Model_04.Wrapper11.System_Attributes[ i] = Name
Value
UM_Model_04.Wrapper11.System_Attributes[ 0] = WORKED_Entity_Sample_Number
19
UM_Model_04.Wrapper11.System_Attributes[ 1] = WORKED_Entity_Sample_Summa
39.0
UM_Model_04.Wrapper11.System_Attributes[ 2] = WORKED_Entity_Average_Staying_Time_in_DESObject
0:00:00:02.053
UM_Model_04.Wrapper11.System_Attributes[ 3] = WORKED_Entity_Through_Output_Rate at Output_Channel[0]
0.0101637 [entity/seconds]
UM_Model_04.Wrapper11.System_Attributes[ 4] = WORKED_Entity_Produce_Time at Output_Channel[0]
98.3888889 [seconds/entity]

UM_Model_04.Wrapper11.First_Calculation? =False

UM_Model_04.Wrapper11.InputChannel_Index_Selection_Strategy =TSelection_Random_Selected_Index
UM_Model_04.Wrapper11.InputChannel_Index =5

UM_Model_04.Wrapper11.Number_Of_InputChannels =6

UM_Model_04.Wrapper11.Input [ 0].Data =#Empty
UM_Model_04.Wrapper11.Input [ 0].Channel_Is_Enabled =False
UM_Model_04.Wrapper11.Input [ 0].Channel_Is_Connected =True (#_of_Entities= 19)

UM_Model_04.Wrapper11.Input [ 1].Data =#Empty
UM_Model_04.Wrapper11.Input [ 1].Channel_Is_Enabled =False
UM_Model_04.Wrapper11.Input [ 1].Channel_Is_Connected =True (#_of_Entities= 57)

UM_Model_04.Wrapper11.Input [ 2].Data =#Empty
UM_Model_04.Wrapper11.Input [ 2].Channel_Is_Enabled =False
UM_Model_04.Wrapper11.Input [ 2].Channel_Is_Connected =False (#_of_Entities= 0)

UM_Model_04.Wrapper11.Input [ 3].Data =#Empty
UM_Model_04.Wrapper11.Input [ 3].Channel_Is_Enabled =False
UM_Model_04.Wrapper11.Input [ 3].Channel_Is_Connected =False (#_of_Entities= 0)

```

```
UM_Model_04.Wrapper11.Input [ 4].Data =#Empty
UM_Model_04.Wrapper11.Input [ 4].Channel_Is_Enabled =False
UM_Model_04.Wrapper11.Input [ 4].Channel_Is_Connected =False    (#_of_Entities= 0)

UM_Model_04.Wrapper11.Input [ 5].Data =#Empty
UM_Model_04.Wrapper11.Input [ 5].Channel_Is_Enabled =False
UM_Model_04.Wrapper11.Input [ 5].Channel_Is_Connected =False    (#_of_Entities= 0)

UM_Model_04.Wrapper11.Capacity =1
UM_Model_04.Wrapper11.Number_Of_Content_Entities =0

UM_Model_04.Wrapper11.OutputChannel_Index_Selection_Strategy =TSelection_Random_Selected_Index
UM_Model_04.Wrapper11.OutputChannel_Index =0

UM_Model_04.Wrapper11.Number_Of_OutputChannels =1

UM_Model_04.Wrapper11.Output [ 0].Data =#Rekesz_03_(#183)
UM_Model_04.Wrapper11.Output [ 0].Channel_Is_Enabled =True
UM_Model_04.Wrapper11.Output [ 0].Channel_Is_Connected =True    (#_of_Entities= 18)

*****
TWRAPPER_end_TWRAPPER_end_TWRAPPER_end_TWRAPPER_end_TWRAPPER_end_TWRAPPER_end_
-----

End of "UM_Model_04.Print_DESObjectList"
```

5.4.3 DES_Modell_04 TDES_ENTITY list

Local time :Fri Oct 23 18:45:46 2020

Model_Name : UM_Model_04

UM_Model_04.Print_DESEntityList_Short: (ENTITYLIST Result)

Number of Entities = 36

GTime_Now [DDD:HH:MM:SS.XXX] = 0:00:30:30.000

```
=====
UM_Model_04.ENTITYLIST[      i] =      Entity_Name  Entity_Position
Entity_Content
=====
```

```
=====
UM_Model_04.ENTITYLIST[      0] = Rekesz_02_(#131)  (Wrapper03__ {TIn_Object})
Content=[#185, #167, #166, #165, #151, #139]
UM_Model_04.ENTITYLIST[      1] = Rekesz_01_(#139)  (Rekesz_02_(#131)__ {TIn_Object})
UM_Model_04.ENTITYLIST[      2] = Rekesz_03_(#151)  (Rekesz_02_(#131)__ {TIn_Object})
Content=[#160, #157, #156]
UM_Model_04.ENTITYLIST[      3] = Rekesz_01_(#154)  (Rekesz_02_(#159)__ {TIn_Object})
UM_Model_04.ENTITYLIST[      4] = Rekesz_01_(#156)  (Rekesz_03_(#151)__ {TIn_Object})
UM_Model_04.ENTITYLIST[      5] = Rekesz_01_(#157)  (Rekesz_03_(#151)__ {TIn_Object})
UM_Model_04.ENTITYLIST[      6] = Rekesz_02_(#159)  (Wrapper02__ {TAt_Output_Channel[0]})
Content=[#182, #181, #180, #168, #154]
UM_Model_04.ENTITYLIST[      7] = Rekesz_01_(#160)  (Rekesz_03_(#151)__ {TIn_Object})
UM_Model_04.ENTITYLIST[      8] = Rekesz_01_(#161)  (Rekesz_03_(#166)__ {TIn_Object})
UM_Model_04.ENTITYLIST[      9] = Rekesz_01_(#162)  (Rekesz_02_(#163)__ {TIn_Object})
UM_Model_04.ENTITYLIST[     10] = Rekesz_02_(#163)  (Wrapper01__ {TAt_Output_Channel[0]})
Content=[#162]
UM_Model_04.ENTITYLIST[     11] =      Barack_(#165)  (Rekesz_02_(#131)__ {TIn_Object})
```

```

UM_Model_04.ENTITYLIST[ 12] = Rekesz_03_(#166) (Rekesz_02_(#131)___{TIn_Object})
Content=[#172, #171, #161]
UM_Model_04.ENTITYLIST[ 13] = Barack_(#167) (Rekesz_02_(#131)___{TIn_Object})
UM_Model_04.ENTITYLIST[ 14] = Rekesz_03_(#168) (Rekesz_02_(#159)___{TIn_Object})
Content=[#176, #174, #173]
UM_Model_04.ENTITYLIST[ 15] = Rekesz_01_(#171) (Rekesz_03_(#166)___{TIn_Object})
UM_Model_04.ENTITYLIST[ 16] = Rekesz_01_(#172) (Rekesz_03_(#166)___{TIn_Object})
UM_Model_04.ENTITYLIST[ 17] = Rekesz_01_(#173) (Rekesz_03_(#168)___{TIn_Object})
UM_Model_04.ENTITYLIST[ 18] = Rekesz_01_(#174) (Rekesz_03_(#168)___{TIn_Object})
UM_Model_04.ENTITYLIST[ 19] = Rekesz_01_(#176) (Rekesz_03_(#168)___{TIn_Object})
UM_Model_04.ENTITYLIST[ 20] = Rekesz_01_(#177) (Rekesz_03_(#181)___{TIn_Object})
UM_Model_04.ENTITYLIST[ 21] = Rekesz_01_(#178) (Rekesz_03_(#181)___{TIn_Object})
UM_Model_04.ENTITYLIST[ 22] = Barack_(#180) (Rekesz_02_(#159)___{TIn_Object})
UM_Model_04.ENTITYLIST[ 23] = Rekesz_03_(#181) (Rekesz_02_(#159)___{TIn_Object})
Content=[#187, #178, #177]
UM_Model_04.ENTITYLIST[ 24] = Barack_(#182) (Rekesz_02_(#159)___{TIn_Object})
UM_Model_04.ENTITYLIST[ 25] = Rekesz_03_(#183) (Wrapper11___{TAt_Output_Channel[0]})
Content=[#192, #189, #188]
UM_Model_04.ENTITYLIST[ 26] = Alma_(#185) (Rekesz_02_(#131)___{TIn_Object})
UM_Model_04.ENTITYLIST[ 27] = Rekesz_01_(#186) (Source0___{TAt_Output_Channel[0]})
UM_Model_04.ENTITYLIST[ 28] = Rekesz_01_(#187) (Rekesz_03_(#181)___{TIn_Object})
UM_Model_04.ENTITYLIST[ 29] = Rekesz_01_(#188) (Rekesz_03_(#183)___{TIn_Object})
UM_Model_04.ENTITYLIST[ 30] = Rekesz_01_(#189) (Rekesz_03_(#183)___{TIn_Object})
UM_Model_04.ENTITYLIST[ 31] = Alma_(#190) (Source4___{TAt_Output_Channel[0]})
UM_Model_04.ENTITYLIST[ 32] = Rekesz_02_(#191) (Source1___{TAt_Output_Channel[0]})
UM_Model_04.ENTITYLIST[ 33] = Rekesz_01_(#192) (Rekesz_03_(#183)___{TIn_Object})
UM_Model_04.ENTITYLIST[ 34] = Rekesz_01_(#193) (Source0___{TAt_Output_Channel[1]})
UM_Model_04.ENTITYLIST[ 35] = Rekesz_01_(#194) (Source0___{TIn_Object})

```

```
UM_Model_04.Print_ENTITYLIST: (ENTITYLIST Result)
```

```
=====
```

```
Number of Entities = 36
```

```
GTime_Now [DDD:HH:MM:SS.XXX] = 0:00:30:30.000
```

```
#####
#####
```

```
ENTITYLIST[ 0]
```

```
ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_
+++++++
UM_Model_04.Rekesz_02_(#131).DESEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at
0x0000022D10CF4280>      (ENTITYLIST)

UM_Model_04.Rekesz_02_(#131).Name_Of_Entity_str =Rekesz_02_(#131)
UM_Model_04.Rekesz_02_(#131).Borning_Time      = 0:00:14:14.000
UM_Model_04.Rekesz_02_(#131).Terminate_Time = Entity is staying in "Wrapper03__{TIn_Object}"

UM_Model_04.Rekesz_02_(#131).InputChannel_Index_Of_Arrive =0
UM_Model_04.Rekesz_02_(#131).OutputChannel_Index_Of_Leave =0

UM_Model_04.Rekesz_02_(#131).System_Attribute[ 0] =
WORKED_Entity_Arrive_Time      1708.000  1708.000
UM_Model_04.Rekesz_02_(#131).System_Attribute[ 1] =
WORKED_Entity_Terminate_Time      -1  Entity is staying in "__{TAt_Input_Channel[0]}"
UM_Model_04.Rekesz_02_(#131).System_Attribute[ 2] =
Wrapper_Channel_Number_Of_Arrive      0  0

UM_Model_04.Rekesz_02_(#131).Number_Of_Content_Entities =6
UM_Model_04.Rekesz_02_(#131).Content_Entities_Vector[ 0] ==<TDES_ENTITY.TDES_ENTITY object at 0x0000022D10E58F10>
UM_Model_04.Rekesz_02_(#131).Content_Entities_Vector[ 1] ==<TDES_ENTITY.TDES_ENTITY object at 0x0000022D10E69670>
UM_Model_04.Rekesz_02_(#131).Content_Entities_Vector[ 2] ==<TDES_ENTITY.TDES_ENTITY object at 0x0000022D10E4EB80>
UM_Model_04.Rekesz_02_(#131).Content_Entities_Vector[ 3] ==<TDES_ENTITY.TDES_ENTITY object at 0x0000022D10E58C70>
UM_Model_04.Rekesz_02_(#131).Content_Entities_Vector[ 4] ==<TDES_ENTITY.TDES_ENTITY object at 0x0000022D10E3DA30>
UM_Model_04.Rekesz_02_(#131).Content_Entities_Vector[ 5] ==<TDES_ENTITY.TDES_ENTITY object at 0x0000022D10E57B50>
-----
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_

#####
#####
ENTITYLIST[      1]

ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_
+++++++
```



```

UM_Model_04.Rekesz_01_(#139).DESEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at
0x0000022D10CF4280>      (ENTITYLIST)

UM_Model_04.Rekesz_01_(#139).Name_Of_Entity_str =Rekesz_01_(#139)
UM_Model_04.Rekesz_01_(#139).Borning_Time      =  0:00:16:17.000
UM_Model_04.Rekesz_01_(#139).Terminate_Time = Entity is staying in "Rekesz_02_(#131)___{TIn_Object}"

UM_Model_04.Rekesz_01_(#139).InputChannel_Index_Of_Arrive =1
UM_Model_04.Rekesz_01_(#139).OutputChannel_Index_Of_Leave =0

UM_Model_04.Rekesz_01_(#139).System_Attribute[  0] =
WORKED_Entity_Arrive_Time      977.000      977.000
UM_Model_04.Rekesz_01_(#139).System_Attribute[  1] =
WORKED_Entity_Terminate_Time      977.000
UM_Model_04.Rekesz_01_(#139).System_Attribute[  2] =
Wrapper_Channel_Number_Of_Arrive      1      1

UM_Model_04.Rekesz_01_(#139).Number_Of_Content_Entities =0
-----
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_

#####
#####
ENTITYLIST[      2]

ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_
+++++++
UM_Model_04.Rekesz_03_(#151).DESEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at
0x0000022D10CF4280>      (ENTITYLIST)

UM_Model_04.Rekesz_03_(#151).Name_Of_Entity_str =Rekesz_03_(#151)
UM_Model_04.Rekesz_03_(#151).Borning_Time      =  0:00:19:19.000
UM_Model_04.Rekesz_03_(#151).Terminate_Time = Entity is staying in "Rekesz_02_(#131)___{TIn_Object}"

UM_Model_04.Rekesz_03_(#151).InputChannel_Index_Of_Arrive =1
UM_Model_04.Rekesz_03_(#151).OutputChannel_Index_Of_Leave =0

```

```

UM_Model_04.Rekesz_03_(#151).System_Attribute[ 0] =
WORKED_Entity_Arrive_Time      1281.000  1281.000
UM_Model_04.Rekesz_03_(#151).System_Attribute[ 1] =
WORKED_Entity_Terminate_Time      1283.000
UM_Model_04.Rekesz_03_(#151).System_Attribute[ 2] =
Wrapper_Channel_Number_Of_Arrive      1  1

UM_Model_04.Rekesz_03_(#151).Number_Of_Content_Entities =3
UM_Model_04.Rekesz_03_(#151).Content_Entities_Vector[ 0] =#<TDES_ENTITY.TDES_ENTITY object at 0x0000022D10E42940>
UM_Model_04.Rekesz_03_(#151).Content_Entities_Vector[ 1] =#<TDES_ENTITY.TDES_ENTITY object at 0x0000022D10E57640>
UM_Model_04.Rekesz_03_(#151).Content_Entities_Vector[ 2] =#<TDES_ENTITY.TDES_ENTITY object at 0x0000022D10E3BAC0>
-----
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_

#####
#####
ENTITYLIST[      3]

ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_
+++++
UM_Model_04.Rekesz_01_(#154).DESEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at
0x0000022D10CF4280>      (ENTITYLIST)

UM_Model_04.Rekesz_01_(#154).Name_Of_Entity_str =Rekesz_01_(#154)
UM_Model_04.Rekesz_01_(#154).Borning_Time      =  0:00:20:21.000
UM_Model_04.Rekesz_01_(#154).Terminate_Time = Entity is staying in "Rekesz_02_(#159)___{TIn_Object}"

UM_Model_04.Rekesz_01_(#154).InputChannel_Index_Of_Arrive =1
UM_Model_04.Rekesz_01_(#154).OutputChannel_Index_Of_Leave =0

UM_Model_04.Rekesz_01_(#154).System_Attribute[ 0] =
WORKED_Entity_Arrive_Time      1221.000  1221.000
UM_Model_04.Rekesz_01_(#154).System_Attribute[ 1] =
WORKED_Entity_Terminate_Time      1221.000

```

```
UM_Model_04.Rekesz_01_(#154).System_Attribute[ 2] =
Wrapper_Channel_Number_Of_Arrive      1 1
```

```
UM_Model_04.Rekesz_01_(#154).Number_Of_Content_Entities =0
```

```
-----
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_
```

```
#####
#####
ENTITYLIST[      4]
```

```
ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_
+++++
```

```
UM_Model_04.Rekesz_01_(#156).DESEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at
0x0000022D10CF4280>      (ENTITYLIST)
```

```
UM_Model_04.Rekesz_01_(#156).Name_Of_Entity_str =Rekesz_01_(#156)
```

```
UM_Model_04.Rekesz_01_(#156).Borning_Time      =  0:00:20:23.000
```

```
UM_Model_04.Rekesz_01_(#156).Terminate_Time = Entity is staying in "Rekesz_03_(#151)___{TIn_Object}"
```

```
UM_Model_04.Rekesz_01_(#156).InputChannel_Index_Of_Arrive =1
```

```
UM_Model_04.Rekesz_01_(#156).OutputChannel_Index_Of_Leave =1
```

```
UM_Model_04.Rekesz_01_(#156).System_Attribute[ 0] =
WORKED_Entity_Arrive_Time      1223.000  1223.000
```

```
UM_Model_04.Rekesz_01_(#156).System_Attribute[ 1] =
WORKED_Entity_Terminate_Time      1223.000
```

```
UM_Model_04.Rekesz_01_(#156).System_Attribute[ 2] =
Wrapper_Channel_Number_Of_Arrive      1 1
```

```
UM_Model_04.Rekesz_01_(#156).Number_Of_Content_Entities =0
```

```
-----
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_
```

```
#####
#####
ENTITYLIST[      5]

ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_
+++++++
UM_Model_04.Rekesz_01_(#157).DESEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at
0x0000022D10CF4280>      (ENTITYLIST)

UM_Model_04.Rekesz_01_(#157).Name_Of_Entity_str =Rekesz_01_(#157)
UM_Model_04.Rekesz_01_(#157).Borning_Time      =  0:00:20:24.000
UM_Model_04.Rekesz_01_(#157).Terminate_Time = Entity is staying in "Rekesz_03_(#151)_{TIn_Object}"

UM_Model_04.Rekesz_01_(#157).InputChannel_Index_Of_Arrive =1
UM_Model_04.Rekesz_01_(#157).OutputChannel_Index_Of_Leave =1

UM_Model_04.Rekesz_01_(#157).System_Attribute[  0] =
WORKED_Entity_Arrive_Time      1224.000   1224.000
UM_Model_04.Rekesz_01_(#157).System_Attribute[  1] =
WORKED_Entity_Terminate_Time      1282.000
UM_Model_04.Rekesz_01_(#157).System_Attribute[  2] =
Wrapper_Channel_Number_Of_Arrive      1   1

UM_Model_04.Rekesz_01_(#157).Number_Of_Content_Entities =0
-----
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_

#####
#####
ENTITYLIST[      6]

ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_
+++++++
UM_Model_04.Rekesz_02_(#159).DESEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at
0x0000022D10CF4280>      (ENTITYLIST)
```

```

UM_Model_04.Rekesz_02_(#159).Name_Of_Entity_str =Rekesz_02_(#159)
UM_Model_04.Rekesz_02_(#159).Borning_Time      = 0:00:21:21.000
UM_Model_04.Rekesz_02_(#159).Terminate_Time = Entity is staying in "Wrapper02__{TAt_Output_Channel[0]}"

UM_Model_04.Rekesz_02_(#159).InputChannel_Index_Of_Arrive =0
UM_Model_04.Rekesz_02_(#159).OutputChannel_Index_Of_Leave =0

UM_Model_04.Rekesz_02_(#159).System_Attribute[ 0] =
WORKED_Entity_Arrive_Time      1708.000  1708.000
UM_Model_04.Rekesz_02_(#159).System_Attribute[ 1] =
WORKED_Entity_Terminate_Time   1769.000
UM_Model_04.Rekesz_02_(#159).System_Attribute[ 2] =
Wrapper_Channel_Number_Of_Arrive      0  0

UM_Model_04.Rekesz_02_(#159).Number_Of_Content_Entities =5
UM_Model_04.Rekesz_02_(#159).Content_Entities_Vector[ 0] =#<TDES_ENTITY.TDES_ENTITY object at 0x0000022D10E6C850>
UM_Model_04.Rekesz_02_(#159).Content_Entities_Vector[ 1] =#<TDES_ENTITY.TDES_ENTITY object at 0x0000022D10E4EA60>
UM_Model_04.Rekesz_02_(#159).Content_Entities_Vector[ 2] =#<TDES_ENTITY.TDES_ENTITY object at 0x0000022D10E4C790>
UM_Model_04.Rekesz_02_(#159).Content_Entities_Vector[ 3] =#<TDES_ENTITY.TDES_ENTITY object at 0x0000022D10E4E3D0>
UM_Model_04.Rekesz_02_(#159).Content_Entities_Vector[ 4] =#<TDES_ENTITY.TDES_ENTITY object at 0x0000022D10E58C10>
-----
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_

#####
#####
ENTITYLIST[      7]

ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_
+++++++
UM_Model_04.Rekesz_01_(#160).DESEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at
0x0000022D10CF4280>      (ENTITYLIST)

UM_Model_04.Rekesz_01_(#160).Name_Of_Entity_str =Rekesz_01_(#160)
UM_Model_04.Rekesz_01_(#160).Borning_Time      = 0:00:21:23.000
UM_Model_04.Rekesz_01_(#160).Terminate_Time = Entity is staying in "Rekesz_03_(#151)__{TIn_Object}"

```

```
UM_Model_04.Rekesz_01_(#160).InputChannel_Index_Of_Arrive =1
UM_Model_04.Rekesz_01_(#160).OutputChannel_Index_Of_Leave =1
```

```
UM_Model_04.Rekesz_01_(#160).System_Attribute[ 0] =
WORKED_Entity_Arrive_Time      1283.000  1283.000
UM_Model_04.Rekesz_01_(#160).System_Attribute[ 1] =
WORKED_Entity_Terminate_Time   1283.000
UM_Model_04.Rekesz_01_(#160).System_Attribute[ 2] =
Wrapper_Channel_Number_Of_Arrive      1  1
```

```
UM_Model_04.Rekesz_01_(#160).Number_Of_Content_Entities =0
```

```
-----
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_
```

```
#####
#####
ENTITYLIST[      8]
```

```
ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_
+++++
```

```
UM_Model_04.Rekesz_01_(#161).DESEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at
0x0000022D10CF4280>      (ENTITYLIST)
```

```
UM_Model_04.Rekesz_01_(#161).Name_Of_Entity_str =Rekesz_01_(#161)
UM_Model_04.Rekesz_01_(#161).Borning_Time      =  0:00:21:24.000
UM_Model_04.Rekesz_01_(#161).Terminate_Time = Entity is staying in "Rekesz_03_(#166)___{TIn_Object}"
```

```
UM_Model_04.Rekesz_01_(#161).InputChannel_Index_Of_Arrive =1
UM_Model_04.Rekesz_01_(#161).OutputChannel_Index_Of_Leave =1
```

```
UM_Model_04.Rekesz_01_(#161).System_Attribute[ 0] =
WORKED_Entity_Arrive_Time      1284.000  1284.000
UM_Model_04.Rekesz_01_(#161).System_Attribute[ 1] =
WORKED_Entity_Terminate_Time   1284.000
```

```
UM_Model_04.Rekesz_01_(#161).System_Attribute[ 2] =
Wrapper_Channel_Number_Of_Arrive      1 1
```

```
UM_Model_04.Rekesz_01_(#161).Number_Of_Content_Entities =0
```

```
-----
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_
```

```
#####
#####
ENTITYLIST[      9]
```

```
ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_
+++++
```

```
UM_Model_04.Rekesz_01_(#162).DESEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at
0x0000022D10CF4280>      (ENTITYLIST)
```

```
UM_Model_04.Rekesz_01_(#162).Name_Of_Entity_str =Rekesz_01_(#162)
UM_Model_04.Rekesz_01_(#162).Borning_Time      =  0:00:21:25.000
UM_Model_04.Rekesz_01_(#162).Terminate_Time = Entity is staying in "Rekesz_02_(#163)___{TIn_Object}"
```

```
UM_Model_04.Rekesz_01_(#162).InputChannel_Index_Of_Arrive =1
UM_Model_04.Rekesz_01_(#162).OutputChannel_Index_Of_Leave =0
```

```
UM_Model_04.Rekesz_01_(#162).System_Attribute[ 0] =
WORKED_Entity_Arrive_Time      1285.000  1285.000
UM_Model_04.Rekesz_01_(#162).System_Attribute[ 1] =
WORKED_Entity_Terminate_Time      1465.000
UM_Model_04.Rekesz_01_(#162).System_Attribute[ 2] =
Wrapper_Channel_Number_Of_Arrive      1 1
```

```
UM_Model_04.Rekesz_01_(#162).Number_Of_Content_Entities =0
```

```
-----
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_
```

```
#####
#####
ENTITYLIST[    10]

ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_
+++++++
UM_Model_04.Rekesz_02_(#163).DESEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at
0x0000022D10CF4280>      (ENTITYLIST)

UM_Model_04.Rekesz_02_(#163).Name_Of_Entity_str =Rekesz_02_(#163)
UM_Model_04.Rekesz_02_(#163).Borning_Time      = 0:00:22:22.000
UM_Model_04.Rekesz_02_(#163).Terminate_Time = Entity is staying in "Wrapper01__{TAt_Output_Channel[0]}"

UM_Model_04.Rekesz_02_(#163).InputChannel_Index_Of_Arrive =0
UM_Model_04.Rekesz_02_(#163).OutputChannel_Index_Of_Leave =0

UM_Model_04.Rekesz_02_(#163).System_Attribute[    0] =
WORKED_Entity_Arrive_Time      1708.000    1708.000
UM_Model_04.Rekesz_02_(#163).System_Attribute[    1] =
WORKED_Entity_Terminate_Time      1708.000
UM_Model_04.Rekesz_02_(#163).System_Attribute[    2] =
Wrapper_Channel_Number_Of_Arrive      0    0

UM_Model_04.Rekesz_02_(#163).Number_Of_Content_Entities =1
UM_Model_04.Rekesz_02_(#163).Content_Entities_Vector[ 0] =#<TDES_ENTITY.TDES_ENTITY object at 0x0000022D10E51C40>
-----
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_

#####
#####
ENTITYLIST[    11]

ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_
+++++++
```



```
UM_Model_04.Barack_(#165).DEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at 0x0000022D10CF4280>
(ENTITYLIST)
```

```
UM_Model_04.Barack_(#165).Name_Of_Entity_str =Barack_(#165)
UM_Model_04.Barack_(#165).Borning_Time      = 0:00:22:22.000
UM_Model_04.Barack_(#165).Terminate_Time = Entity is staying in "Rekesz_02_(#131)___{TIn_Object}"
```

```
UM_Model_04.Barack_(#165).InputChannel_Index_Of_Arrive =2
UM_Model_04.Barack_(#165).OutputChannel_Index_Of_Leave =0
```

```
UM_Model_04.Barack_(#165).System_Attribute[ 0] =
WORKED_Entity_Arrive_Time      1342.000      1342.000
UM_Model_04.Barack_(#165).System_Attribute[ 1] =
WORKED_Entity_Terminate_Time    1342.000
UM_Model_04.Barack_(#165).System_Attribute[ 2] =
Wrapper_Channel_Number_Of_Arrive      2      2
```

```
UM_Model_04.Barack_(#165).Number_Of_Content_Entities =0
```

```
-----
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_
```

```
#####
#####
ENTITYLIST[      12]
```

```
ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_
+++++++
UM_Model_04.Rekesz_03_(#166).DEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at
0x0000022D10CF4280>      (ENTITYLIST)
```

```
UM_Model_04.Rekesz_03_(#166).Name_Of_Entity_str =Rekesz_03_(#166)
UM_Model_04.Rekesz_03_(#166).Borning_Time      = 0:00:22:22.000
UM_Model_04.Rekesz_03_(#166).Terminate_Time = Entity is staying in "Rekesz_02_(#131)___{TIn_Object}"
```

```
UM_Model_04.Rekesz_03_(#166).InputChannel_Index_Of_Arrive =1
UM_Model_04.Rekesz_03_(#166).OutputChannel_Index_Of_Leave =0
```

```

UM_Model_04.Rekesz_03_(#166).System_Attribute[ 0] =
WORKED_Entity_Arrive_Time      1464.000   1464.000
UM_Model_04.Rekesz_03_(#166).System_Attribute[ 1] =
WORKED_Entity_Terminate_Time      1466.000
UM_Model_04.Rekesz_03_(#166).System_Attribute[ 2] =
Wrapper_Channel_Number_Of_Arrive      1   1

UM_Model_04.Rekesz_03_(#166).Number_Of_Content_Entities =3
UM_Model_04.Rekesz_03_(#166).Content_Entities_Vector[ 0] =#<TDES_ENTITY.TDES_ENTITY object at 0x0000022D10E36610>
UM_Model_04.Rekesz_03_(#166).Content_Entities_Vector[ 1] =#<TDES_ENTITY.TDES_ENTITY object at 0x0000022D10E485E0>
UM_Model_04.Rekesz_03_(#166).Content_Entities_Vector[ 2] =#<TDES_ENTITY.TDES_ENTITY object at 0x0000022D10E48130>
-----
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_

#####
#####
ENTITYLIST[      13]

ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_
+++++++
UM_Model_04.Barack_(#167).DESEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at 0x0000022D10CF4280>
(ENTITYLIST)

UM_Model_04.Barack_(#167).Name_Of_Entity_str =Barack_(#167)
UM_Model_04.Barack_(#167).Borning_Time      =  0:00:23:23.000
UM_Model_04.Barack_(#167).Terminate_Time = Entity is staying in "Rekesz_02_(#131)___{TIn_Object}"

UM_Model_04.Barack_(#167).InputChannel_Index_Of_Arrive =2
UM_Model_04.Barack_(#167).OutputChannel_Index_Of_Leave =0

UM_Model_04.Barack_(#167).System_Attribute[ 0] =
WORKED_Entity_Arrive_Time      1403.000   1403.000
UM_Model_04.Barack_(#167).System_Attribute[ 1] =
WORKED_Entity_Terminate_Time      1525.000

```

```
UM_Model_04.Barack_(#167).System_Attribute[ 2] =
Wrapper_Channel_Number_Of_Arrive          2 2
```

```
UM_Model_04.Barack_(#167).Number_Of_Content_Entities =0
```

```
-----
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_
```

```
#####
#####
ENTITYLIST[      14]
```

```
ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_
+++++
```

```
UM_Model_04.Rekesz_03_(#168).DESEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at
0x0000022D10CF4280>      (ENTITYLIST)
```

```
UM_Model_04.Rekesz_03_(#168).Name_Of_Entity_str =Rekesz_03_(#168)
UM_Model_04.Rekesz_03_(#168).Borning_Time      =  0:00:23:23.000
UM_Model_04.Rekesz_03_(#168).Terminate_Time = Entity is staying in "Rekesz_02_(#159)___{TIn_Object}"
```

```
UM_Model_04.Rekesz_03_(#168).InputChannel_Index_Of_Arrive =1
UM_Model_04.Rekesz_03_(#168).OutputChannel_Index_Of_Leave =0
```

```
UM_Model_04.Rekesz_03_(#168).System_Attribute[ 0] =
WORKED_Entity_Arrive_Time      1525.000  1525.000
UM_Model_04.Rekesz_03_(#168).System_Attribute[ 1] =
WORKED_Entity_Terminate_Time      1527.000
UM_Model_04.Rekesz_03_(#168).System_Attribute[ 2] =
Wrapper_Channel_Number_Of_Arrive      1 1
```

```
UM_Model_04.Rekesz_03_(#168).Number_Of_Content_Entities =3
UM_Model_04.Rekesz_03_(#168).Content_Entities_Vector[ 0] ==<TDES_ENTITY.TDES_ENTITY object at 0x0000022D10E48700>
UM_Model_04.Rekesz_03_(#168).Content_Entities_Vector[ 1] ==<TDES_ENTITY.TDES_ENTITY object at 0x0000022D10E6C970>
UM_Model_04.Rekesz_03_(#168).Content_Entities_Vector[ 2] ==<TDES_ENTITY.TDES_ENTITY object at 0x0000022D10E48250>
```

```
-----
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_
```

```
#####
#####
ENTITYLIST[    15]

ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_
+++++++
UM_Model_04.Rekesz_01_(#171).DESEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at
0x0000022D10CF4280>      (ENTITYLIST)

UM_Model_04.Rekesz_01_(#171).Name_Of_Entity_str =Rekesz_01_(#171)
UM_Model_04.Rekesz_01_(#171).Borning_Time      =  0:00:24:25.000
UM_Model_04.Rekesz_01_(#171).Terminate_Time = Entity is staying in "Rekesz_03_(#166)___{TIn_Object}"

UM_Model_04.Rekesz_01_(#171).InputChannel_Index_Of_Arrive =1
UM_Model_04.Rekesz_01_(#171).OutputChannel_Index_Of_Leave =1

UM_Model_04.Rekesz_01_(#171).System_Attribute[    0] =
WORKED_Entity_Arrive_Time      1465.000    1465.000
UM_Model_04.Rekesz_01_(#171).System_Attribute[    1] =
WORKED_Entity_Terminate_Time      1465.000
UM_Model_04.Rekesz_01_(#171).System_Attribute[    2] =
Wrapper_Channel_Number_Of_Arrive      1    1

UM_Model_04.Rekesz_01_(#171).Number_Of_Content_Entities =0
-----
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_

#####
#####
ENTITYLIST[    16]

ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_
```

```
+++++
```

```
UM_Model_04.Rekesz_01_(#172).DESEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at  
0x0000022D10CF4280> (ENTITYLIST)
```

```
UM_Model_04.Rekesz_01_(#172).Name_Of_Entity_str =Rekesz_01_(#172)
```

```
UM_Model_04.Rekesz_01_(#172).Borning_Time = 0:00:24:26.000
```

```
UM_Model_04.Rekesz_01_(#172).Terminate_Time = Entity is staying in "Rekesz_03_(#166)___{TIn_Object}"
```

```
UM_Model_04.Rekesz_01_(#172).InputChannel_Index_Of_Arrive =1
```

```
UM_Model_04.Rekesz_01_(#172).OutputChannel_Index_Of_Leave =1
```

```
UM_Model_04.Rekesz_01_(#172).System_Attribute[ 0] =
```

```
WORKED_Entity_Arrive_Time 1466.000 1466.000
```

```
UM_Model_04.Rekesz_01_(#172).System_Attribute[ 1] =
```

```
WORKED_Entity_Terminate_Time 1466.000
```

```
UM_Model_04.Rekesz_01_(#172).System_Attribute[ 2] =
```

```
Wrapper_Channel_Number_Of_Arrive 1 1
```

```
UM_Model_04.Rekesz_01_(#172).Number_Of_Content_Entities =0
```

```
-----  
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_
```

```
#####
```

```
#####
```

```
ENTITYLIST[ 17]
```

```
ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_
```

```
+++++
```

```
UM_Model_04.Rekesz_01_(#173).DESEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at  
0x0000022D10CF4280> (ENTITYLIST)
```

```
UM_Model_04.Rekesz_01_(#173).Name_Of_Entity_str =Rekesz_01_(#173)
```

```
UM_Model_04.Rekesz_01_(#173).Borning_Time = 0:00:24:27.000
```

```
UM_Model_04.Rekesz_01_(#173).Terminate_Time = Entity is staying in "Rekesz_03_(#168)___{TIn_Object}"
```

```
UM_Model_04.Rekesz_01_(#173).InputChannel_Index_Of_Arrive =1
```

```
UM_Model_04.Rekesz_01_(#173).OutputChannel_Index_Of_Leave =1
```

```
UM_Model_04.Rekesz_01_(#173).System_Attribute[ 0] =
WORKED_Entity_Arrive_Time      1467.000  1467.000
UM_Model_04.Rekesz_01_(#173).System_Attribute[ 1] =
WORKED_Entity_Terminate_Time      1467.000
UM_Model_04.Rekesz_01_(#173).System_Attribute[ 2] =
Wrapper_Channel_Number_Of_Arrive      1  1
```

```
UM_Model_04.Rekesz_01_(#173).Number_Of_Content_Entities =0
```

```
-----
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_
```

```
#####
#####
ENTITYLIST[      18]
```

```
ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_
+++++
```

```
UM_Model_04.Rekesz_01_(#174).DESEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at
0x0000022D10CF4280>      (ENTITYLIST)
```

```
UM_Model_04.Rekesz_01_(#174).Name_Of_Entity_str =Rekesz_01_(#174)
UM_Model_04.Rekesz_01_(#174).Borning_Time      =  0:00:24:28.000
UM_Model_04.Rekesz_01_(#174).Terminate_Time = Entity is staying in "Rekesz_03_(#168)___{TIn_Object}"
```

```
UM_Model_04.Rekesz_01_(#174).InputChannel_Index_Of_Arrive =1
UM_Model_04.Rekesz_01_(#174).OutputChannel_Index_Of_Leave =1
```

```
UM_Model_04.Rekesz_01_(#174).System_Attribute[ 0] =
WORKED_Entity_Arrive_Time      1468.000  1468.000
UM_Model_04.Rekesz_01_(#174).System_Attribute[ 1] =
WORKED_Entity_Terminate_Time      1526.000
UM_Model_04.Rekesz_01_(#174).System_Attribute[ 2] =
Wrapper_Channel_Number_Of_Arrive      1  1
```

```
UM_Model_04.Rekesz_01_(#174).Number_Of_Content_Entities =0
```

```
-----  
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_
```

```
#####  
#####  
ENTITYLIST[    19]
```

```
ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_  
+++++
```

```
UM_Model_04.Rekesz_01_(#176).DESEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at  
0x0000022D10CF4280>      (ENTITYLIST)
```

```
UM_Model_04.Rekesz_01_(#176).Name_Of_Entity_str =Rekesz_01_(#176)  
UM_Model_04.Rekesz_01_(#176).Borning_Time      =  0:00:25:27.000  
UM_Model_04.Rekesz_01_(#176).Terminate_Time = Entity is staying in "Rekesz_03_(#168)_{TIn_Object}"
```

```
UM_Model_04.Rekesz_01_(#176).InputChannel_Index_Of_Arrive =1  
UM_Model_04.Rekesz_01_(#176).OutputChannel_Index_Of_Leave =1
```

```
UM_Model_04.Rekesz_01_(#176).System_Attribute[    0] =  
WORKED_Entity_Arrive_Time      1527.000    1527.000  
UM_Model_04.Rekesz_01_(#176).System_Attribute[    1] =  
WORKED_Entity_Terminate_Time      1527.000  
UM_Model_04.Rekesz_01_(#176).System_Attribute[    2] =  
Wrapper_Channel_Number_Of_Arrive      1    1
```

```
UM_Model_04.Rekesz_01_(#176).Number_Of_Content_Entities =0
```

```
-----  
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_
```

```
#####  
#####
```

```
ENTITYLIST[    20]
```

```
ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_
+++++
```

```
UM_Model_04.Rekesz_01_(#177).DESEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at
0x0000022D10CF4280>      (ENTITYLIST)
```

```
UM_Model_04.Rekesz_01_(#177).Name_Of_Entity_str =Rekesz_01_(#177)
```

```
UM_Model_04.Rekesz_01_(#177).Borning_Time      =  0:00:25:28.000
```

```
UM_Model_04.Rekesz_01_(#177).Terminate_Time = Entity is staying in "Rekesz_03_(#181)_{TIn_Object}"
```

```
UM_Model_04.Rekesz_01_(#177).InputChannel_Index_Of_Arrive =1
```

```
UM_Model_04.Rekesz_01_(#177).OutputChannel_Index_Of_Leave =1
```

```
UM_Model_04.Rekesz_01_(#177).System_Attribute[    0] =
```

```
WORKED_Entity_Arrive_Time      1528.000   1528.000
```

```
UM_Model_04.Rekesz_01_(#177).System_Attribute[    1] =
```

```
WORKED_Entity_Terminate_Time      1528.000
```

```
UM_Model_04.Rekesz_01_(#177).System_Attribute[    2] =
```

```
Wrapper_Channel_Number_Of_Arrive      1   1
```

```
UM_Model_04.Rekesz_01_(#177).Number_Of_Content_Entities =0
```

```
-----
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_
```

```
#####
#####
```

```
ENTITYLIST[    21]
```

```
ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_
+++++
```

```
UM_Model_04.Rekesz_01_(#178).DESEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at
0x0000022D10CF4280>      (ENTITYLIST)
```

```
UM_Model_04.Rekesz_01_(#178).Name_Of_Entity_str =Rekesz_01_(#178)
```

```
UM_Model_04.Rekesz_01_(#178).Borning_Time      =  0:00:25:29.000
```



```
UM_Model_04.Rekesz_01_(#178).Terminate_Time = Entity is staying in "Rekesz_03_(#181)___{TIn_Object}"
```

```
UM_Model_04.Rekesz_01_(#178).InputChannel_Index_Of_Arrive =1
```

```
UM_Model_04.Rekesz_01_(#178).OutputChannel_Index_Of_Leave =1
```

```
UM_Model_04.Rekesz_01_(#178).System_Attribute[ 0] =
```

```
WORKED_Entity_Arrive_Time      1529.000  1529.000
```

```
UM_Model_04.Rekesz_01_(#178).System_Attribute[ 1] =
```

```
WORKED_Entity_Terminate_Time      1709.000
```

```
UM_Model_04.Rekesz_01_(#178).System_Attribute[ 2] =
```

```
Wrapper_Channel_Number_Of_Arrive      1  1
```

```
UM_Model_04.Rekesz_01_(#178).Number_Of_Content_Entities =0
```

```
-----  
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_
```

```
#####
```

```
#####
```

```
ENTITYLIST[      22]
```

```
ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_
```

```
+++++
```

```
UM_Model_04.Barack_(#180).DESEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at 0x0000022D10CF4280>  
(ENTITYLIST)
```

```
UM_Model_04.Barack_(#180).Name_Of_Entity_str =Barack_(#180)
```

```
UM_Model_04.Barack_(#180).Borning_Time      =  0:00:26:26.000
```

```
UM_Model_04.Barack_(#180).Terminate_Time = Entity is staying in "Rekesz_02_(#159)___{TIn_Object}"
```

```
UM_Model_04.Barack_(#180).InputChannel_Index_Of_Arrive =2
```

```
UM_Model_04.Barack_(#180).OutputChannel_Index_Of_Leave =0
```

```
UM_Model_04.Barack_(#180).System_Attribute[ 0] =
```

```
WORKED_Entity_Arrive_Time      1586.000  1586.000
```

```
UM_Model_04.Barack_(#180).System_Attribute[ 1] =
```

```
WORKED_Entity_Terminate_Time      1586.000
```

```
UM_Model_04.Barack_(#180).System_Attribute[ 2] =
Wrapper_Channel_Number_Of_Arrive          2 2
```

```
UM_Model_04.Barack_(#180).Number_Of_Content_Entities =0
```

```
-----
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_
```

```
#####
#####
ENTITYLIST[      23]
```

```
ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_
+++++
```

```
UM_Model_04.Rekesz_03_(#181).DESEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at
0x0000022D10CF4280>      (ENTITYLIST)
```

```
UM_Model_04.Rekesz_03_(#181).Name_Of_Entity_str =Rekesz_03_(#181)
UM_Model_04.Rekesz_03_(#181).Borning_Time      =  0:00:26:26.000
UM_Model_04.Rekesz_03_(#181).Terminate_Time = Entity is staying in "Rekesz_02_(#159)___{TIn_Object}"
```

```
UM_Model_04.Rekesz_03_(#181).InputChannel_Index_Of_Arrive =1
UM_Model_04.Rekesz_03_(#181).OutputChannel_Index_Of_Leave =0
```

```
UM_Model_04.Rekesz_03_(#181).System_Attribute[ 0] =
WORKED_Entity_Arrive_Time      1708.000  1708.000
UM_Model_04.Rekesz_03_(#181).System_Attribute[ 1] =
WORKED_Entity_Terminate_Time      1710.000
UM_Model_04.Rekesz_03_(#181).System_Attribute[ 2] =
Wrapper_Channel_Number_Of_Arrive      1 1
```

```
UM_Model_04.Rekesz_03_(#181).Number_Of_Content_Entities =3
UM_Model_04.Rekesz_03_(#181).Content_Entities_Vector[ 0] =#<TDES_ENTITY.TDES_ENTITY object at 0x0000022D10E692E0>
UM_Model_04.Rekesz_03_(#181).Content_Entities_Vector[ 1] =#<TDES_ENTITY.TDES_ENTITY object at 0x0000022D10E48730>
UM_Model_04.Rekesz_03_(#181).Content_Entities_Vector[ 2] =#<TDES_ENTITY.TDES_ENTITY object at 0x0000022D10E48460>
```

```
-----
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_
```

```
#####
#####
ENTITYLIST[      24]

ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_
+++++++
UM_Model_04.Barack_(#182).DESEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at 0x0000022D10CF4280>
(ENTITYLIST)

UM_Model_04.Barack_(#182).Name_Of_Entity_str =Barack_(#182)
UM_Model_04.Barack_(#182).Borning_Time      = 0:00:27:27.000
UM_Model_04.Barack_(#182).Terminate_Time = Entity is staying in "Rekesz_02_(#159)_{TIn_Object}"

UM_Model_04.Barack_(#182).InputChannel_Index_Of_Arrive =2
UM_Model_04.Barack_(#182).OutputChannel_Index_Of_Leave =0

UM_Model_04.Barack_(#182).System_Attribute[  0] =
WORKED_Entity_Arrive_Time      1647.000  1647.000
UM_Model_04.Barack_(#182).System_Attribute[  1] =
WORKED_Entity_Terminate_Time      1769.000
UM_Model_04.Barack_(#182).System_Attribute[  2] =
Wrapper_Channel_Number_Of_Arrive      2  2

UM_Model_04.Barack_(#182).Number_Of_Content_Entities =0
-----
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_

#####
#####
ENTITYLIST[      25]

ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_
```

```

+++++
UM_Model_04.Rekesz_03_(#183).DESEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at
0x0000022D10CF4280>      (ENTITYLIST)

UM_Model_04.Rekesz_03_(#183).Name_Of_Entity_str =Rekesz_03_(#183)
UM_Model_04.Rekesz_03_(#183).Borning_Time      =  0:00:27:27.000
UM_Model_04.Rekesz_03_(#183).Terminate_Time = Entity is staying in "Wrapper11__{TAt_Output_Channel[0]}"

UM_Model_04.Rekesz_03_(#183).InputChannel_Index_Of_Arrive =0
UM_Model_04.Rekesz_03_(#183).OutputChannel_Index_Of_Leave =0

UM_Model_04.Rekesz_03_(#183).System_Attribute[  0] =
WORKED_Entity_Arrive_Time      1769.000   1769.000
UM_Model_04.Rekesz_03_(#183).System_Attribute[  1] =
WORKED_Entity_Terminate_Time   1771.000
UM_Model_04.Rekesz_03_(#183).System_Attribute[  2] =
Wrapper_Channel_Number_Of_Arrive      0   0

UM_Model_04.Rekesz_03_(#183).Number_Of_Content_Entities =3
UM_Model_04.Rekesz_03_(#183).Content_Entities_Vector[ 0] =#<TDES_ENTITY.TDES_ENTITY object at 0x0000022D10E6CDF0>
UM_Model_04.Rekesz_03_(#183).Content_Entities_Vector[ 1] =#<TDES_ENTITY.TDES_ENTITY object at 0x0000022D10E43D00>
UM_Model_04.Rekesz_03_(#183).Content_Entities_Vector[ 2] =#<TDES_ENTITY.TDES_ENTITY object at 0x0000022D10E4F670>
-----
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_

#####
#####
ENTITYLIST[      26]

ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_
+++++
UM_Model_04.Alma_(#185).DESEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at 0x0000022D10CF4280>
(ENTITYLIST)

UM_Model_04.Alma_(#185).Name_Of_Entity_str =Alma_(#185)
UM_Model_04.Alma_(#185).Borning_Time      =  0:00:28:28.000

```

```
UM_Model_04.Alma_(#185).Terminate_Time = Entity is staying in "Rekesz_02_(#131)_{TIn_Object}"
```

```
UM_Model_04.Alma_(#185).InputChannel_Index_Of_Arrive =1
```

```
UM_Model_04.Alma_(#185).OutputChannel_Index_Of_Leave =0
```

```
UM_Model_04.Alma_(#185).System_Attribute[ 0] = WORKED_Entity_Arrive_Time
1708.000 1708.000
```

```
UM_Model_04.Alma_(#185).System_Attribute[ 1] = WORKED_Entity_Terminate_Time
1769.000
```

```
UM_Model_04.Alma_(#185).System_Attribute[ 2] = Wrapper_Channel_Number_Of_Arrive
1 1
```

```
UM_Model_04.Alma_(#185).Number_Of_Content_Entities =0
```

```
-----
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_
```

```
#####
```

```
#####
```

```
ENTITYLIST[ 27]
```

```
ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_
```

```
+++++
```

```
UM_Model_04.Rekesz_01_(#186).DESEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at
0x0000022D10CF4280> (ENTITYLIST)
```

```
UM_Model_04.Rekesz_01_(#186).Name_Of_Entity_str =Rekesz_01_(#186)
```

```
UM_Model_04.Rekesz_01_(#186).Borning_Time = 0:00:28:29.000
```

```
UM_Model_04.Rekesz_01_(#186).Terminate_Time = Entity is staying in "Source0_{TAt_Output_Channel[0]}"
```

```
UM_Model_04.Rekesz_01_(#186).InputChannel_Index_Of_Arrive =0
```

```
UM_Model_04.Rekesz_01_(#186).OutputChannel_Index_Of_Leave =0
```

```
UM_Model_04.Rekesz_01_(#186).System_Attribute[ 0] =
WORKED_Entity_Arrive_Time 1709.000 1709.000
```

```
UM_Model_04.Rekesz_01_(#186).System_Attribute[ 1] =
WORKED_Entity_Terminate_Time 1709.000
```

```
UM_Model_04.Rekesz_01_(#186).Number_Of_Content_Entities =0
```

```
-----  
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_
```

```
#####
```

```
#####
```

```
ENTITYLIST[    28]
```

```
ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_
```

```
+++++
```

```
UM_Model_04.Rekesz_01_(#187).DESEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at  
0x0000022D10CF4280>      (ENTITYLIST)
```

```
UM_Model_04.Rekesz_01_(#187).Name_Of_Entity_str =Rekesz_01_(#187)
```

```
UM_Model_04.Rekesz_01_(#187).Borning_Time      =  0:00:28:30.000
```

```
UM_Model_04.Rekesz_01_(#187).Terminate_Time = Entity is staying in "Rekesz_03_(#181)_{TIn_Object}"
```

```
UM_Model_04.Rekesz_01_(#187).InputChannel_Index_Of_Arrive =1
```

```
UM_Model_04.Rekesz_01_(#187).OutputChannel_Index_Of_Leave =1
```

```
UM_Model_04.Rekesz_01_(#187).System_Attribute[    0] =
```

```
WORKED_Entity_Arrive_Time      1710.000    1710.000
```

```
UM_Model_04.Rekesz_01_(#187).System_Attribute[    1] =
```

```
WORKED_Entity_Terminate_Time      1710.000
```

```
UM_Model_04.Rekesz_01_(#187).System_Attribute[    2] =
```

```
Wrapper_Channel_Number_Of_Arrive      1    1
```

```
UM_Model_04.Rekesz_01_(#187).Number_Of_Content_Entities =0
```

```
-----  
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_
```

```
#####
#####
ENTITYLIST[    29]

ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_
+++++++
UM_Model_04.Rekesz_01_(#188).DESEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at
0x0000022D10CF4280>    (ENTITYLIST)

UM_Model_04.Rekesz_01_(#188).Name_Of_Entity_str =Rekesz_01_(#188)
UM_Model_04.Rekesz_01_(#188).Borning_Time    =  0:00:28:31.000
UM_Model_04.Rekesz_01_(#188).Terminate_Time = Entity is staying in "Rekesz_03_(#183)_{TIn_Object}"

UM_Model_04.Rekesz_01_(#188).InputChannel_Index_Of_Arrive =1
UM_Model_04.Rekesz_01_(#188).OutputChannel_Index_Of_Leave =1

UM_Model_04.Rekesz_01_(#188).System_Attribute[    0] =
WORKED_Entity_Arrive_Time    1711.000    1711.000
UM_Model_04.Rekesz_01_(#188).System_Attribute[    1] =
WORKED_Entity_Terminate_Time    1711.000
UM_Model_04.Rekesz_01_(#188).System_Attribute[    2] =
Wrapper_Channel_Number_Of_Arrive    1    1

UM_Model_04.Rekesz_01_(#188).Number_Of_Content_Entities =0
-----
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_

#####
#####
ENTITYLIST[    30]

ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_
+++++++
UM_Model_04.Rekesz_01_(#189).DESEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at
0x0000022D10CF4280>    (ENTITYLIST)
```

```

UM_Model_04.Rekesz_01_(#189).Name_Of_Entity_str =Rekesz_01_(#189)
UM_Model_04.Rekesz_01_(#189).Borning_Time      = 0:00:28:32.000
UM_Model_04.Rekesz_01_(#189).Terminate_Time = Entity is staying in "Rekesz_03_(#183)___{TIn_Object}"

```

```

UM_Model_04.Rekesz_01_(#189).InputChannel_Index_Of_Arrive =1
UM_Model_04.Rekesz_01_(#189).OutputChannel_Index_Of_Leave =1

```

```

UM_Model_04.Rekesz_01_(#189).System_Attribute[ 0] =
WORKED_Entity_Arrive_Time      1712.000    1712.000
UM_Model_04.Rekesz_01_(#189).System_Attribute[ 1] =
WORKED_Entity_Terminate_Time   1770.000
UM_Model_04.Rekesz_01_(#189).System_Attribute[ 2] =
Wrapper_Channel_Number_Of_Arrive      1    1

```

```

UM_Model_04.Rekesz_01_(#189).Number_Of_Content_Entities =0

```

```

-----
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_

```

```

#####
#####
ENTITYLIST[      31]

```

```

ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_
+++++

```

```

UM_Model_04.Alma_(#190).DESEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at 0x0000022D10CF4280>
(ENTITYLIST)

```

```

UM_Model_04.Alma_(#190).Name_Of_Entity_str =Alma_(#190)
UM_Model_04.Alma_(#190).Borning_Time      = 0:00:29:29.000
UM_Model_04.Alma_(#190).Terminate_Time = Entity is staying in "Source4___{TAt_Output_Channel[0]}"

```

```

UM_Model_04.Alma_(#190).InputChannel_Index_Of_Arrive =0
UM_Model_04.Alma_(#190).OutputChannel_Index_Of_Leave =0

```

```

UM_Model_04.Alma_(#190).System_Attribute[ 0] =                                WORKED_Entity_Arrive_Time
1769.000    1769.000

```



```

UM_Model_04.Alma_(#190).System_Attribute[ 1] = WORKED_Entity_Terminate_Time
1830.000

UM_Model_04.Alma_(#190).Number_Of_Content_Entities =0
-----
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_

#####
#####
ENTITYLIST[ 32]

ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_
+++++++
UM_Model_04.Rekesz_02_(#191).DESEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at
0x0000022D10CF4280> (ENTITYLIST)

UM_Model_04.Rekesz_02_(#191).Name_Of_Entity_str =Rekesz_02_(#191)
UM_Model_04.Rekesz_02_(#191).Borning_Time = 0:00:29:29.000
UM_Model_04.Rekesz_02_(#191).Terminate_Time = Entity is staying in "Source1__{TAt_Output_Channel[0]}"

UM_Model_04.Rekesz_02_(#191).InputChannel_Index_Of_Arrive =0
UM_Model_04.Rekesz_02_(#191).OutputChannel_Index_Of_Leave =0

UM_Model_04.Rekesz_02_(#191).System_Attribute[ 0] =
WORKED_Entity_Arrive_Time 1769.000 1769.000
UM_Model_04.Rekesz_02_(#191).System_Attribute[ 1] =
WORKED_Entity_Terminate_Time 1769.000

UM_Model_04.Rekesz_02_(#191).Number_Of_Content_Entities =0
-----
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_

```

```
#####
#####
ENTITYLIST[    33]

ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_
+++++++
UM_Model_04.Rekesz_01_(#192).DESEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at
0x0000022D10CF4280>      (ENTITYLIST)

UM_Model_04.Rekesz_01_(#192).Name_Of_Entity_str =Rekesz_01_(#192)
UM_Model_04.Rekesz_01_(#192).Borning_Time      = 0:00:29:31.000
UM_Model_04.Rekesz_01_(#192).Terminate_Time = Entity is staying in "Rekesz_03_(#183)_{TIn_Object}"

UM_Model_04.Rekesz_01_(#192).InputChannel_Index_Of_Arrive =1
UM_Model_04.Rekesz_01_(#192).OutputChannel_Index_Of_Leave =1

UM_Model_04.Rekesz_01_(#192).System_Attribute[    0] =
WORKED_Entity_Arrive_Time      1771.000    1771.000
UM_Model_04.Rekesz_01_(#192).System_Attribute[    1] =
WORKED_Entity_Terminate_Time      1771.000
UM_Model_04.Rekesz_01_(#192).System_Attribute[    2] =
Wrapper_Channel_Number_Of_Arrive      1    1

UM_Model_04.Rekesz_01_(#192).Number_Of_Content_Entities =0
-----
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_

#####
#####
ENTITYLIST[    34]

ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_
+++++++
UM_Model_04.Rekesz_01_(#193).DESEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at
0x0000022D10CF4280>      (ENTITYLIST)
```

```

UM_Model_04.Rekesz_01_(#193).Name_Of_Entity_str =Rekesz_01_(#193)
UM_Model_04.Rekesz_01_(#193).Borning_Time      = 0:00:29:32.000
UM_Model_04.Rekesz_01_(#193).Terminate_Time = Entity is staying in "Source0__{TAt_Output_Channel[1]}"

UM_Model_04.Rekesz_01_(#193).InputChannel_Index_Of_Arrive =0
UM_Model_04.Rekesz_01_(#193).OutputChannel_Index_Of_Leave =1

UM_Model_04.Rekesz_01_(#193).System_Attribute[ 0] =
WORKED_Entity_Arrive_Time      1772.000  1772.000
UM_Model_04.Rekesz_01_(#193).System_Attribute[ 1] =
WORKED_Entity_Terminate_Time      1772.000

UM_Model_04.Rekesz_01_(#193).Number_Of_Content_Entities =0
-----
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_

#####
#####
ENTITYLIST[      35]

ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_ENTITY_start_
+++++
UM_Model_04.Rekesz_01_(#194).DESEntity_Owner_class =<TDES_ENTITYLIST.TDES_ENTITYLIST object at
0x0000022D10CF4280>      (ENTITYLIST)

UM_Model_04.Rekesz_01_(#194).Name_Of_Entity_str =Rekesz_01_(#194)
UM_Model_04.Rekesz_01_(#194).Borning_Time      = 0:00:29:33.000
UM_Model_04.Rekesz_01_(#194).Terminate_Time = Entity is staying in "Source0__{TIn_Object}"

UM_Model_04.Rekesz_01_(#194).InputChannel_Index_Of_Arrive =0
UM_Model_04.Rekesz_01_(#194).OutputChannel_Index_Of_Leave =0

UM_Model_04.Rekesz_01_(#194).System_Attribute[ 0] =
WORKED_Entity_Arrive_Time      1773.000  1773.000
UM_Model_04.Rekesz_01_(#194).System_Attribute[ 1] =
WORKED_Entity_Terminate_Time      -1  Entity is staying in "__{TIn_Object}"

```

```
UM_Model_04.Rekesz_01_(#194).Number_Of_Content_Entities =0
```

```
-----  
ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_ENTITY_end_
```

5.4.4a DES_Modell_04 Simple TDES_SINKED_ENTITY list

Local time :Fri Oct 23 18:45:46 2020

Model_Name : UM_Model_04

UM_Model_04.Print_DESEntityList_Short: (SINKED ENTITYLIST Result)

Number of Entities = 7

GTime_Now [DDD:HH:MM:SS.XXX] = 0:00:30:30.000

```
=====
UM_Model_04.SINKED_ENTITYLIST[      i] =      Entity_Name  Entity_Position
Bornig_Time      Terminate_Time      Entity_Age
=====
```

```
=====
UM_Model_04.SINKED_ENTITYLIST[      0] =  Rekesz_02_(#48)  (Sink1__{TIn_Object})
0:00:00:00.000      0:00:04:04.000      0:00:04:04.000
UM_Model_04.SINKED_ENTITYLIST[      1] =  Rekesz_02_(#58)  (Sink1__{TIn_Object})
0:00:01:01.000      0:00:08:08.000      0:00:07:07.000
UM_Model_04.SINKED_ENTITYLIST[      2] =  Rekesz_02_(#66)  (Sink1__{TIn_Object})
0:00:02:02.000      0:00:12:12.000      0:00:10:00.000
UM_Model_04.SINKED_ENTITYLIST[      3] =  Rekesz_02_(#74)  (Sink1__{TIn_Object})
0:00:03:03.000      0:00:16:16.000      0:00:13:13.000
UM_Model_04.SINKED_ENTITYLIST[      4] =  Rekesz_02_(#81)  (Sink1__{TIn_Object})
0:00:04:04.000      0:00:20:20.000      0:00:16:16.000
UM_Model_04.SINKED_ENTITYLIST[      5] =  Rekesz_02_(#92)  (Sink1__{TIn_Object})
0:00:05:05.000      0:00:24:24.000      0:00:19:19.000
UM_Model_04.SINKED_ENTITYLIST[      6] =  Rekesz_02_(#127) (Sink1__{TIn_Object})
0:00:13:13.000      0:00:28:28.000      0:00:15:15.000
```

5.4.4b DES_Modell_04 Detailed TDES_SINKED_ENTITY list

Local time :Fri Oct 23 18:47:12 2020

Model_Name : UM_Model_04

UM_Model_04.Print_DESEntityList_Short: (SINKED ENTITYLIST Result)

=====

Number of Entities = 112

GTime_Now [DDD:HH:MM:SS.XXX] = 0:00:30:30.000

=====

=====

=====

UM_Model_04.SINKED_ENTITYLIST[i]	Entity_Name	Entity_Position
Borning_Time	Terminate_Time	Entity_Age

=====

=====

=====

UM_Model_04.SINKED_ENTITYLIST[0]	=	Alma_(#77)	(Rekesz_02_(#48)___{TIn_Object})
0:00:03:03.000		0:00:04:04.000	0:00:01:01.000
UM_Model_04.SINKED_ENTITYLIST[1]	=	Alma_(#69)	(Rekesz_02_(#48)___{TIn_Object})
0:00:02:02.000		0:00:04:04.000	0:00:02:02.000
UM_Model_04.SINKED_ENTITYLIST[2]	=	Alma_(#61)	(Rekesz_02_(#48)___{TIn_Object})
0:00:01:01.000		0:00:04:04.000	0:00:03:03.000
UM_Model_04.SINKED_ENTITYLIST[3]	=	Alma_(#51)	(Rekesz_02_(#48)___{TIn_Object})
0:00:00:00.000		0:00:04:04.000	0:00:04:04.000
UM_Model_04.SINKED_ENTITYLIST[4]	=	Rekesz_01_(#63)	(Rekesz_03_(#59)___{TIn_Object})
0:00:01:03.000		0:00:04:04.000	0:00:03:01.000
UM_Model_04.SINKED_ENTITYLIST[5]	=	Rekesz_01_(#57)	(Rekesz_03_(#59)___{TIn_Object})
0:00:00:06.000		0:00:04:04.000	0:00:03:58.000
UM_Model_04.SINKED_ENTITYLIST[6]	=	Rekesz_01_(#54)	(Rekesz_03_(#59)___{TIn_Object})
0:00:00:03.000		0:00:04:04.000	0:00:04:01.000
UM_Model_04.SINKED_ENTITYLIST[7]	=	Rekesz_03_(#59)	(Rekesz_02_(#48)___{TIn_Object})
0:00:01:01.000		0:00:04:04.000	0:00:03:03.000

UM_Model_04.SINKED_ENTITYLIST[8]	=	Barack_ (#60)	(Rekesz_02_ (#48) __{TIn_Object})
0:00:01:01.000		0:00:04:04.000	0:00:03:03.000
UM_Model_04.SINKED_ENTITYLIST[9]	=	Rekesz_01_ (#53)	(Rekesz_03_ (#49) __{TIn_Object})
0:00:00:02.000		0:00:04:04.000	0:00:04:02.000
UM_Model_04.SINKED_ENTITYLIST[10]	=	Rekesz_01_ (#52)	(Rekesz_03_ (#49) __{TIn_Object})
0:00:00:01.000		0:00:04:04.000	0:00:04:03.000
UM_Model_04.SINKED_ENTITYLIST[11]	=	Rekesz_01_ (#47)	(Rekesz_03_ (#49) __{TIn_Object})
0:00:00:00.000		0:00:04:04.000	0:00:04:04.000
UM_Model_04.SINKED_ENTITYLIST[12]	=	Rekesz_03_ (#49)	(Rekesz_02_ (#48) __{TIn_Object})
0:00:00:00.000		0:00:04:04.000	0:00:04:04.000
UM_Model_04.SINKED_ENTITYLIST[13]	=	Barack_ (#50)	(Rekesz_02_ (#48) __{TIn_Object})
0:00:00:00.000		0:00:04:04.000	0:00:04:04.000
UM_Model_04.SINKED_ENTITYLIST[14]	=	Rekesz_01_ (#55)	(Rekesz_02_ (#48) __{TIn_Object})
0:00:00:04.000		0:00:04:04.000	0:00:04:00.000
UM_Model_04.SINKED_ENTITYLIST[15]	=	Rekesz_02_ (#48)	(Sink1__{TIn_Object})
0:00:00:00.000		0:00:04:04.000	0:00:04:04.000
UM_Model_04.SINKED_ENTITYLIST[16]	=	Alma_ (#104)	(Rekesz_02_ (#58) __{TIn_Object})
0:00:07:07.000		0:00:08:08.000	0:00:01:01.000
UM_Model_04.SINKED_ENTITYLIST[17]	=	Alma_ (#98)	(Rekesz_02_ (#58) __{TIn_Object})
0:00:06:06.000		0:00:08:08.000	0:00:02:02.000
UM_Model_04.SINKED_ENTITYLIST[18]	=	Alma_ (#91)	(Rekesz_02_ (#58) __{TIn_Object})
0:00:05:05.000		0:00:08:08.000	0:00:03:03.000
UM_Model_04.SINKED_ENTITYLIST[19]	=	Alma_ (#84)	(Rekesz_02_ (#58) __{TIn_Object})
0:00:04:04.000		0:00:08:08.000	0:00:04:04.000
UM_Model_04.SINKED_ENTITYLIST[20]	=	Rekesz_01_ (#78)	(Rekesz_03_ (#75) __{TIn_Object})
0:00:03:05.000		0:00:08:08.000	0:00:05:03.000
UM_Model_04.SINKED_ENTITYLIST[21]	=	Rekesz_01_ (#73)	(Rekesz_03_ (#75) __{TIn_Object})
0:00:02:06.000		0:00:08:08.000	0:00:06:02.000
UM_Model_04.SINKED_ENTITYLIST[22]	=	Rekesz_01_ (#72)	(Rekesz_03_ (#75) __{TIn_Object})
0:00:02:05.000		0:00:08:08.000	0:00:06:03.000
UM_Model_04.SINKED_ENTITYLIST[23]	=	Rekesz_03_ (#75)	(Rekesz_02_ (#58) __{TIn_Object})
0:00:03:03.000		0:00:08:08.000	0:00:05:05.000
UM_Model_04.SINKED_ENTITYLIST[24]	=	Barack_ (#76)	(Rekesz_02_ (#58) __{TIn_Object})
0:00:03:03.000		0:00:08:08.000	0:00:05:05.000
UM_Model_04.SINKED_ENTITYLIST[25]	=	Rekesz_01_ (#71)	(Rekesz_03_ (#67) __{TIn_Object})
0:00:02:04.000		0:00:08:08.000	0:00:06:04.000
UM_Model_04.SINKED_ENTITYLIST[26]	=	Rekesz_01_ (#65)	(Rekesz_03_ (#67) __{TIn_Object})
0:00:01:05.000		0:00:08:08.000	0:00:07:03.000

UM_Model_04.SINKED_ENTITYLIST[27]	=	Rekesz_01_(#64)	(Rekesz_03_(#67)___{TIn_Object})
0:00:01:04.000		0:00:08:08.000	0:00:07:04.000
UM_Model_04.SINKED_ENTITYLIST[28]	=	Rekesz_03_(#67)	(Rekesz_02_(#58)___{TIn_Object})
0:00:02:02.000		0:00:08:08.000	0:00:06:06.000
UM_Model_04.SINKED_ENTITYLIST[29]	=	Barack_(#68)	(Rekesz_02_(#58)___{TIn_Object})
0:00:02:02.000		0:00:08:08.000	0:00:06:06.000
UM_Model_04.SINKED_ENTITYLIST[30]	=	Rekesz_01_(#56)	(Rekesz_02_(#58)___{TIn_Object})
0:00:00:05.000		0:00:08:08.000	0:00:08:03.000
UM_Model_04.SINKED_ENTITYLIST[31]	=	Rekesz_02_(#58)	(Sink1___{TIn_Object})
0:00:01:01.000		0:00:08:08.000	0:00:07:07.000
UM_Model_04.SINKED_ENTITYLIST[32]	=	Alma_(#120)	(Rekesz_02_(#66)___{TIn_Object})
0:00:11:11.000		0:00:12:12.000	0:00:01:01.000
UM_Model_04.SINKED_ENTITYLIST[33]	=	Alma_(#117)	(Rekesz_02_(#66)___{TIn_Object})
0:00:10:00.000		0:00:12:12.000	0:00:02:02.000
UM_Model_04.SINKED_ENTITYLIST[34]	=	Alma_(#111)	(Rekesz_02_(#66)___{TIn_Object})
0:00:09:09.000		0:00:12:12.000	0:00:03:03.000
UM_Model_04.SINKED_ENTITYLIST[35]	=	Alma_(#106)	(Rekesz_02_(#66)___{TIn_Object})
0:00:08:08.000		0:00:12:12.000	0:00:04:04.000
UM_Model_04.SINKED_ENTITYLIST[36]	=	Rekesz_01_(#93)	(Rekesz_03_(#89)___{TIn_Object})
0:00:05:07.000		0:00:12:12.000	0:00:07:05.000
UM_Model_04.SINKED_ENTITYLIST[37]	=	Rekesz_01_(#88)	(Rekesz_03_(#89)___{TIn_Object})
0:00:04:08.000		0:00:12:12.000	0:00:08:04.000
UM_Model_04.SINKED_ENTITYLIST[38]	=	Rekesz_01_(#87)	(Rekesz_03_(#89)___{TIn_Object})
0:00:04:07.000		0:00:12:12.000	0:00:08:05.000
UM_Model_04.SINKED_ENTITYLIST[39]	=	Rekesz_03_(#89)	(Rekesz_02_(#66)___{TIn_Object})
0:00:05:05.000		0:00:12:12.000	0:00:07:07.000
UM_Model_04.SINKED_ENTITYLIST[40]	=	Barack_(#90)	(Rekesz_02_(#66)___{TIn_Object})
0:00:05:05.000		0:00:12:12.000	0:00:07:07.000
UM_Model_04.SINKED_ENTITYLIST[41]	=	Rekesz_01_(#86)	(Rekesz_03_(#82)___{TIn_Object})
0:00:04:06.000		0:00:12:12.000	0:00:08:06.000
UM_Model_04.SINKED_ENTITYLIST[42]	=	Rekesz_01_(#85)	(Rekesz_03_(#82)___{TIn_Object})
0:00:04:05.000		0:00:12:12.000	0:00:08:07.000
UM_Model_04.SINKED_ENTITYLIST[43]	=	Rekesz_01_(#79)	(Rekesz_03_(#82)___{TIn_Object})
0:00:03:06.000		0:00:12:12.000	0:00:09:06.000
UM_Model_04.SINKED_ENTITYLIST[44]	=	Rekesz_03_(#82)	(Rekesz_02_(#66)___{TIn_Object})
0:00:04:04.000		0:00:12:12.000	0:00:08:08.000
UM_Model_04.SINKED_ENTITYLIST[45]	=	Barack_(#83)	(Rekesz_02_(#66)___{TIn_Object})
0:00:04:04.000		0:00:12:12.000	0:00:08:08.000

UM_Model_04.SINKED_ENTITYLIST[46]	=	Rekesz_01_(#62)	(Rekesz_02_(#66)___{TIn_Object})
0:00:01:02.000		0:00:12:12.000	0:00:11:00.000
UM_Model_04.SINKED_ENTITYLIST[47]	=	Rekesz_02_(#66)	(Sink1___{TIn_Object})
0:00:02:02.000		0:00:12:12.000	0:00:10:00.000
UM_Model_04.SINKED_ENTITYLIST[48]	=	Alma_(#137)	(Rekesz_02_(#74)___{TIn_Object})
0:00:15:15.000		0:00:16:16.000	0:00:01:01.000
UM_Model_04.SINKED_ENTITYLIST[49]	=	Alma_(#132)	(Rekesz_02_(#74)___{TIn_Object})
0:00:14:14.000		0:00:16:16.000	0:00:02:02.000
UM_Model_04.SINKED_ENTITYLIST[50]	=	Alma_(#126)	(Rekesz_02_(#74)___{TIn_Object})
0:00:13:13.000		0:00:16:16.000	0:00:03:03.000
UM_Model_04.SINKED_ENTITYLIST[51]	=	Alma_(#121)	(Rekesz_02_(#74)___{TIn_Object})
0:00:12:12.000		0:00:16:16.000	0:00:04:04.000
UM_Model_04.SINKED_ENTITYLIST[52]	=	Barack_(#103)	(Rekesz_02_(#74)___{TIn_Object})
0:00:07:07.000		0:00:16:16.000	0:00:09:09.000
UM_Model_04.SINKED_ENTITYLIST[53]	=	Rekesz_01_(#108)	(Rekesz_03_(#102)___{TIn_Object})
0:00:08:00.000		0:00:16:16.000	0:00:08:06.000
UM_Model_04.SINKED_ENTITYLIST[54]	=	Rekesz_01_(#101)	(Rekesz_03_(#102)___{TIn_Object})
0:00:06:00.000		0:00:16:16.000	0:00:10:06.000
UM_Model_04.SINKED_ENTITYLIST[55]	=	Rekesz_01_(#100)	(Rekesz_03_(#102)___{TIn_Object})
0:00:06:09.000		0:00:16:16.000	0:00:10:07.000
UM_Model_04.SINKED_ENTITYLIST[56]	=	Rekesz_03_(#102)	(Rekesz_02_(#74)___{TIn_Object})
0:00:07:07.000		0:00:16:16.000	0:00:09:09.000
UM_Model_04.SINKED_ENTITYLIST[57]	=	Barack_(#97)	(Rekesz_02_(#74)___{TIn_Object})
0:00:06:06.000		0:00:16:16.000	0:00:10:00.000
UM_Model_04.SINKED_ENTITYLIST[58]	=	Rekesz_01_(#99)	(Rekesz_03_(#96)___{TIn_Object})
0:00:06:08.000		0:00:16:16.000	0:00:10:08.000
UM_Model_04.SINKED_ENTITYLIST[59]	=	Rekesz_01_(#95)	(Rekesz_03_(#96)___{TIn_Object})
0:00:05:09.000		0:00:16:16.000	0:00:11:07.000
UM_Model_04.SINKED_ENTITYLIST[60]	=	Rekesz_01_(#94)	(Rekesz_03_(#96)___{TIn_Object})
0:00:05:08.000		0:00:16:16.000	0:00:11:08.000
UM_Model_04.SINKED_ENTITYLIST[61]	=	Rekesz_03_(#96)	(Rekesz_02_(#74)___{TIn_Object})
0:00:06:06.000		0:00:16:16.000	0:00:10:00.000
UM_Model_04.SINKED_ENTITYLIST[62]	=	Rekesz_01_(#70)	(Rekesz_02_(#74)___{TIn_Object})
0:00:02:03.000		0:00:16:16.000	0:00:14:13.000
UM_Model_04.SINKED_ENTITYLIST[63]	=	Rekesz_02_(#74)	(Sink1___{TIn_Object})
0:00:03:03.000		0:00:16:16.000	0:00:13:13.000
UM_Model_04.SINKED_ENTITYLIST[64]	=	Alma_(#152)	(Rekesz_02_(#81)___{TIn_Object})
0:00:19:19.000		0:00:20:20.000	0:00:01:01.000

UM_Model_04.SINKED_ENTITYLIST[65]	=	Alma_(#147)	(Rekesz_02_(#81)___{TIn_Object})
0:00:18:18.000	0:00:20:20.000	0:00:02:02.000	
UM_Model_04.SINKED_ENTITYLIST[66]	=	Alma_(#143)	(Rekesz_02_(#81)___{TIn_Object})
0:00:17:17.000	0:00:20:20.000	0:00:03:03.000	
UM_Model_04.SINKED_ENTITYLIST[67]	=	Alma_(#138)	(Rekesz_02_(#81)___{TIn_Object})
0:00:16:16.000	0:00:20:20.000	0:00:04:04.000	
UM_Model_04.SINKED_ENTITYLIST[68]	=	Barack_(#119)	(Rekesz_02_(#81)___{TIn_Object})
0:00:11:11.000	0:00:20:20.000	0:00:09:09.000	
UM_Model_04.SINKED_ENTITYLIST[69]	=	Rekesz_01_(#123)	(Rekesz_03_(#112)___{TIn_Object})
0:00:12:14.000	0:00:20:20.000	0:00:08:06.000	
UM_Model_04.SINKED_ENTITYLIST[70]	=	Rekesz_01_(#115)	(Rekesz_03_(#112)___{TIn_Object})
0:00:09:13.000	0:00:20:20.000	0:00:11:07.000	
UM_Model_04.SINKED_ENTITYLIST[71]	=	Rekesz_01_(#114)	(Rekesz_03_(#112)___{TIn_Object})
0:00:09:12.000	0:00:20:20.000	0:00:11:08.000	
UM_Model_04.SINKED_ENTITYLIST[72]	=	Rekesz_03_(#112)	(Rekesz_02_(#81)___{TIn_Object})
0:00:09:09.000	0:00:20:20.000	0:00:11:11.000	
UM_Model_04.SINKED_ENTITYLIST[73]	=	Barack_(#118)	(Rekesz_02_(#81)___{TIn_Object})
0:00:10:00.000	0:00:20:20.000	0:00:10:00.000	
UM_Model_04.SINKED_ENTITYLIST[74]	=	Rekesz_01_(#113)	(Rekesz_03_(#105)___{TIn_Object})
0:00:09:11.000	0:00:20:20.000	0:00:11:09.000	
UM_Model_04.SINKED_ENTITYLIST[75]	=	Rekesz_01_(#110)	(Rekesz_03_(#105)___{TIn_Object})
0:00:08:12.000	0:00:20:20.000	0:00:12:08.000	
UM_Model_04.SINKED_ENTITYLIST[76]	=	Rekesz_01_(#109)	(Rekesz_03_(#105)___{TIn_Object})
0:00:08:11.000	0:00:20:20.000	0:00:12:09.000	
UM_Model_04.SINKED_ENTITYLIST[77]	=	Rekesz_03_(#105)	(Rekesz_02_(#81)___{TIn_Object})
0:00:08:08.000	0:00:20:20.000	0:00:12:12.000	
UM_Model_04.SINKED_ENTITYLIST[78]	=	Rekesz_01_(#80)	(Rekesz_02_(#81)___{TIn_Object})
0:00:03:07.000	0:00:20:20.000	0:00:17:13.000	
UM_Model_04.SINKED_ENTITYLIST[79]	=	Rekesz_02_(#81)	(Sink1___{TIn_Object})
0:00:04:04.000	0:00:20:20.000	0:00:16:16.000	
UM_Model_04.SINKED_ENTITYLIST[80]	=	Alma_(#169)	(Rekesz_02_(#92)___{TIn_Object})
0:00:23:23.000	0:00:24:24.000	0:00:01:01.000	
UM_Model_04.SINKED_ENTITYLIST[81]	=	Alma_(#164)	(Rekesz_02_(#92)___{TIn_Object})
0:00:22:22.000	0:00:24:24.000	0:00:02:02.000	
UM_Model_04.SINKED_ENTITYLIST[82]	=	Alma_(#158)	(Rekesz_02_(#92)___{TIn_Object})
0:00:21:21.000	0:00:24:24.000	0:00:03:03.000	
UM_Model_04.SINKED_ENTITYLIST[83]	=	Alma_(#153)	(Rekesz_02_(#92)___{TIn_Object})
0:00:20:20.000	0:00:24:24.000	0:00:04:04.000	

UM_Model_04.SINKED_ENTITYLIST[84]	=	Barack_(#135)	(Rekesz_02_(#92)___{TIn_Object})
0:00:15:15.000		0:00:24:24.000	0:00:09:09.000
UM_Model_04.SINKED_ENTITYLIST[85]	=	Rekesz_01_(#140)	(Rekesz_03_(#134)___{TIn_Object})
0:00:16:18.000		0:00:24:24.000	0:00:08:06.000
UM_Model_04.SINKED_ENTITYLIST[86]	=	Rekesz_01_(#139)	(Rekesz_03_(#134)___{TIn_Object})
0:00:16:17.000		0:00:24:24.000	0:00:08:07.000
UM_Model_04.SINKED_ENTITYLIST[87]	=	Rekesz_01_(#129)	(Rekesz_03_(#134)___{TIn_Object})
0:00:13:16.000		0:00:24:24.000	0:00:11:08.000
UM_Model_04.SINKED_ENTITYLIST[88]	=	Rekesz_03_(#134)	(Rekesz_02_(#92)___{TIn_Object})
0:00:14:14.000		0:00:24:24.000	0:00:10:00.000
UM_Model_04.SINKED_ENTITYLIST[89]	=	Barack_(#133)	(Rekesz_02_(#92)___{TIn_Object})
0:00:14:14.000		0:00:24:24.000	0:00:10:00.000
UM_Model_04.SINKED_ENTITYLIST[90]	=	Rekesz_01_(#128)	(Rekesz_03_(#116)___{TIn_Object})
0:00:13:15.000		0:00:24:24.000	0:00:11:09.000
UM_Model_04.SINKED_ENTITYLIST[91]	=	Rekesz_01_(#125)	(Rekesz_03_(#116)___{TIn_Object})
0:00:12:16.000		0:00:24:24.000	0:00:12:08.000
UM_Model_04.SINKED_ENTITYLIST[92]	=	Rekesz_01_(#124)	(Rekesz_03_(#116)___{TIn_Object})
0:00:12:15.000		0:00:24:24.000	0:00:12:09.000
UM_Model_04.SINKED_ENTITYLIST[93]	=	Rekesz_03_(#116)	(Rekesz_02_(#92)___{TIn_Object})
0:00:10:00.000		0:00:24:24.000	0:00:14:14.000
UM_Model_04.SINKED_ENTITYLIST[94]	=	Rekesz_01_(#107)	(Rekesz_02_(#92)___{TIn_Object})
0:00:08:09.000		0:00:24:24.000	0:00:16:15.000
UM_Model_04.SINKED_ENTITYLIST[95]	=	Rekesz_02_(#92)	(Sink1___{TIn_Object})
0:00:05:05.000		0:00:24:24.000	0:00:19:19.000
UM_Model_04.SINKED_ENTITYLIST[96]	=	Alma_(#184)	(Rekesz_02_(#127)___{TIn_Object})
0:00:27:27.000		0:00:28:28.000	0:00:01:01.000
UM_Model_04.SINKED_ENTITYLIST[97]	=	Alma_(#179)	(Rekesz_02_(#127)___{TIn_Object})
0:00:26:26.000		0:00:28:28.000	0:00:02:02.000
UM_Model_04.SINKED_ENTITYLIST[98]	=	Alma_(#175)	(Rekesz_02_(#127)___{TIn_Object})
0:00:25:25.000		0:00:28:28.000	0:00:03:03.000
UM_Model_04.SINKED_ENTITYLIST[99]	=	Alma_(#170)	(Rekesz_02_(#127)___{TIn_Object})
0:00:24:24.000		0:00:28:28.000	0:00:04:04.000
UM_Model_04.SINKED_ENTITYLIST[100]	=	Barack_(#150)	(Rekesz_02_(#127)___{TIn_Object})
0:00:19:19.000		0:00:28:28.000	0:00:09:09.000
UM_Model_04.SINKED_ENTITYLIST[101]	=	Rekesz_01_(#155)	(Rekesz_03_(#149)___{TIn_Object})
0:00:20:22.000		0:00:28:28.000	0:00:08:06.000
UM_Model_04.SINKED_ENTITYLIST[102]	=	Rekesz_01_(#146)	(Rekesz_03_(#149)___{TIn_Object})
0:00:17:21.000		0:00:28:28.000	0:00:11:07.000

UM_Model_04.SINKED_ENTITYLIST[103]	=	Rekesz_01_(#145)	(Rekesz_03_(#149)___{TIn_Object})
0:00:17:20.000		0:00:28:28.000	0:00:11:08.000
UM_Model_04.SINKED_ENTITYLIST[104]	=	Rekesz_03_(#149)	(Rekesz_02_(#127)___{TIn_Object})
0:00:18:18.000		0:00:28:28.000	0:00:10:00.000
UM_Model_04.SINKED_ENTITYLIST[105]	=	Barack_(#148)	(Rekesz_02_(#127)___{TIn_Object})
0:00:18:18.000		0:00:28:28.000	0:00:10:00.000
UM_Model_04.SINKED_ENTITYLIST[106]	=	Rekesz_01_(#144)	(Rekesz_03_(#136)___{TIn_Object})
0:00:17:19.000		0:00:28:28.000	0:00:11:09.000
UM_Model_04.SINKED_ENTITYLIST[107]	=	Rekesz_01_(#142)	(Rekesz_03_(#136)___{TIn_Object})
0:00:16:20.000		0:00:28:28.000	0:00:12:08.000
UM_Model_04.SINKED_ENTITYLIST[108]	=	Rekesz_01_(#141)	(Rekesz_03_(#136)___{TIn_Object})
0:00:16:19.000		0:00:28:28.000	0:00:12:09.000
UM_Model_04.SINKED_ENTITYLIST[109]	=	Rekesz_03_(#136)	(Rekesz_02_(#127)___{TIn_Object})
0:00:15:15.000		0:00:28:28.000	0:00:13:13.000
UM_Model_04.SINKED_ENTITYLIST[110]	=	Rekesz_01_(#122)	(Rekesz_02_(#127)___{TIn_Object})
0:00:12:13.000		0:00:28:28.000	0:00:16:15.000
UM_Model_04.SINKED_ENTITYLIST[111]	=	Rekesz_02_(#127)	(Sink1___{TIn_Object})
0:00:13:13.000		0:00:28:28.000	0:00:15:15.000

5.4.5 DES_Modell_04 TDES_TASK list

Local time :Fri Oct 23 18:47:12 2020
 Model_Name : UM_Model_04

UM_Model_04.Print_DESBranch_TaskList:

=====

Number of DES_Tasks = 6

GTime_Now [DDD:HH:MM:SS.XXX] = 0:00:30:30.000

=====

=====

=====

UM_Model_04.DESTaskList [i]	TaskTimeSender_Name	DESObject_Type	Command	Process#
State Content				

=====

=====

=====

UM_Model_04.DESTaskList [0]	0:00:30:30.000	Source1	TSOURCE	TDESOBJECT_Next_State	0
TIIdle	>nil>-[x]->#191,x,x,x,x,x>				
UM_Model_04.DESTaskList [1]	0:00:30:30.000	Source4	TSOURCE	TDESOBJECT_Next_State	0
TBlocked	>nil>-[x]->#190,x,x,x,x,x>				
UM_Model_04.DESTaskList [2]	0:00:30:30.000	Source3	TSOURCE	TDESOBJECT_Next_State	0
TBlocked	>nil>-[x]->x,x,x,x,x,x>				
UM_Model_04.DESTaskList [3]	0:00:30:30.000	Source2	TSOURCE	TDESOBJECT_Next_State	0
TBlocked	>nil>-[x]->x,x,x,x,x,x>				
UM_Model_04.DESTaskList [4]	0:00:30:30.000	Source4	TSOURCE	TENTITY_Move_Request	0
TBlocked	>nil>-[x]->#190,x,x,x,x,x>				
UM_Model_04.DESTaskList [5]	0:00:30:30.000	Source4	TSOURCE	TENTITY_Move_Request	0
TBlocked	>nil>-[x]->#190,x,x,x,x,x>				

5.4.6 DES_Model_04 TBUFFER occupancy list

```
Local time :Fri Oct 23 18:47:12 2020
Model_Name : UM_Model_04
```

```
UM_Model_04.Print_Content_Entities_Vector_Occupancy:
=====
Number of DESObjects = 0
GTime_Now [DDD:HH:MM:SS.XXX] = 0:00:30:30.000
```

```
End of "UM_Model_04.Print_TBUFFEs_Occupancy"
```

5.4.7 DES_Model_04 Program results

```
Run of "DES_Single_DESBranch.py" has started!
```

```
Local time :Fri Oct 23 18:47:12 2020
Model_Name : UM_Model_04
```

```
UM_Model_04.Print_ObjectList_Short:
=====
Number of DESObjects = 10
GTime_Now [DDD:HH:MM:SS.XXX] = 0:00:00:00.000
```

```

=====
=====
=====
UM_Model_04.DESObjectList[    i] = DESObject_Name  DESObject_Type    State      Last_Calculation_Time
DESObject_Content
=====
=====
=====
UM_Model_04.DESObjectList[    0] =          Sink1           TSINK      TIdle      0:00:00:00.000
>x,x,x,x,x,x>-[x]->nil>
UM_Model_04.DESObjectList[    1] =          Source0          TSOURCE    TIdle      0:00:00:00.000
>nil>-[x]->x,x,x,x,x,x>    (Capacity = 1)
UM_Model_04.DESObjectList[    2] =          Source1          TSOURCE    TIdle      0:00:00:00.000
>nil>-[x]->x,x,x,x,x,x>    (Capacity = 1)
UM_Model_04.DESObjectList[    3] =          Source2          TSOURCE    TIdle      0:00:00:00.000
>nil>-[x]->x,x,x,x,x,x>    (Capacity = 1)
UM_Model_04.DESObjectList[    4] =          Source3          TSOURCE    TIdle      0:00:00:00.000
>nil>-[x]->x,x,x,x,x,x>    (Capacity = 1)
UM_Model_04.DESObjectList[    5] =          Source4          TSOURCE    TIdle      0:00:00:00.000
>nil>-[x]->x,x,x,x,x,x>    (Capacity = 1)
UM_Model_04.DESObjectList[    6] =          Wrapper01        TWRAPPER   TIdle      0:00:00:00.000
>x,x,x,x,x,x>-[x]->x>      (TWrapper_Waiting_for_Package)
UM_Model_04.DESObjectList[    7] =          Wrapper02        TWRAPPER   TIdle      0:00:00:00.000
>x,x,x,x,x,x>-[x]->x>      (TWrapper_Waiting_for_Package)
UM_Model_04.DESObjectList[    8] =          Wrapper03        TWRAPPER   TIdle      0:00:00:00.000
>x,x,x,x,x,x>-[x]->x>      (TWrapper_Waiting_for_Package)
UM_Model_04.DESObjectList[    9] =          Wrapper11        TWRAPPER   TIdle      0:00:00:00.000
>x,x,x,x,x,x>-[x]->x>      (TWrapper_Waiting_for_Package)

UM_Model_04.DESBranch_Insert_First_DESTask_Of_SOURCES_Into_DESTaskList
=====

UM_Model_04.Print_DESBranch_TaskList:
=====
Number of DES_Tasks = 5
GTime_Now [DDD:HH:MM:SS.XXX] =   0:00:00:00.000

```

```

=====
=====
=====
UM_Model_04.DESTaskList [    i] =          TaskTimeSender_Name  DESObject_Type          Command  Process#
State      Content
=====
=====
=====
UM_Model_04.DESTaskList [    0] =    0:00:00:00.000    Source0          TSOURCE    TDESOBJECT_Next_State          0
TIdle      >nil>-[x]->x,x,x,x,x,x>
UM_Model_04.DESTaskList [    1] =    0:00:00:00.000    Source1          TSOURCE    TDESOBJECT_Next_State          0
TIdle      >nil>-[x]->x,x,x,x,x,x>
UM_Model_04.DESTaskList [    2] =    0:00:00:00.000    Source2          TSOURCE    TDESOBJECT_Next_State          0
TIdle      >nil>-[x]->x,x,x,x,x,x>
UM_Model_04.DESTaskList [    3] =    0:00:00:00.000    Source3          TSOURCE    TDESOBJECT_Next_State          0
TIdle      >nil>-[x]->x,x,x,x,x,x>
UM_Model_04.DESTaskList [    4] =    0:00:00:00.000    Source4          TSOURCE    TDESOBJECT_Next_State          0
TIdle      >nil>-[x]->x,x,x,x,x,x>

UM_Model_04.DESBranch_Calculate_Next_DESTask:
=====

UM_Model_04.Print_DESEntityList_Short: (ENTITYLIST Result)
=====
Number of Entities = 36
GTime_Now [DDD:HH:MM:SS.XXX] =    0:00:30:30.000
=====
=====
=====
UM_Model_04.ENTITYLIST[    i] =          Entity_Name  Entity_Position
Entity_Content

```



```

=====
=====
=====
UM_Model_04.ENTITYLIST[    0] = Rekesz_01_(#130)  (Rekesz_02_(#131)___{TIn_Object})
UM_Model_04.ENTITYLIST[    1] = Rekesz_02_(#131)  (Wrapper03___{TIn_Object})
Content=[#185, #167, #166, #165, #151, #130]
UM_Model_04.ENTITYLIST[    2] = Rekesz_03_(#151)  (Rekesz_02_(#131)___{TIn_Object})
Content=[#160, #157, #156]
UM_Model_04.ENTITYLIST[    3] = Rekesz_01_(#154)  (Rekesz_02_(#159)___{TIn_Object})
UM_Model_04.ENTITYLIST[    4] = Rekesz_01_(#156)  (Rekesz_03_(#151)___{TIn_Object})
UM_Model_04.ENTITYLIST[    5] = Rekesz_01_(#157)  (Rekesz_03_(#151)___{TIn_Object})
UM_Model_04.ENTITYLIST[    6] = Rekesz_02_(#159)  (Wrapper02___{TAt_Output_Channel[0]})
Content=[#182, #181, #180, #168, #154]
UM_Model_04.ENTITYLIST[    7] = Rekesz_01_(#160)  (Rekesz_03_(#151)___{TIn_Object})
UM_Model_04.ENTITYLIST[    8] = Rekesz_01_(#161)  (Rekesz_03_(#166)___{TIn_Object})
UM_Model_04.ENTITYLIST[    9] = Rekesz_01_(#162)  (Rekesz_02_(#163)___{TIn_Object})
UM_Model_04.ENTITYLIST[   10] = Rekesz_02_(#163)  (Wrapper01___{TAt_Output_Channel[0]})
Content=[#162]
UM_Model_04.ENTITYLIST[   11] =   Barack_(#165)  (Rekesz_02_(#131)___{TIn_Object})
UM_Model_04.ENTITYLIST[   12] = Rekesz_03_(#166)  (Rekesz_02_(#131)___{TIn_Object})
Content=[#172, #171, #161]
UM_Model_04.ENTITYLIST[   13] =   Barack_(#167)  (Rekesz_02_(#131)___{TIn_Object})
UM_Model_04.ENTITYLIST[   14] = Rekesz_03_(#168)  (Rekesz_02_(#159)___{TIn_Object})
Content=[#176, #174, #173]
UM_Model_04.ENTITYLIST[   15] = Rekesz_01_(#171)  (Rekesz_03_(#166)___{TIn_Object})
UM_Model_04.ENTITYLIST[   16] = Rekesz_01_(#172)  (Rekesz_03_(#166)___{TIn_Object})
UM_Model_04.ENTITYLIST[   17] = Rekesz_01_(#173)  (Rekesz_03_(#168)___{TIn_Object})
UM_Model_04.ENTITYLIST[   18] = Rekesz_01_(#174)  (Rekesz_03_(#168)___{TIn_Object})
UM_Model_04.ENTITYLIST[   19] = Rekesz_01_(#176)  (Rekesz_03_(#168)___{TIn_Object})
UM_Model_04.ENTITYLIST[   20] = Rekesz_01_(#177)  (Rekesz_03_(#181)___{TIn_Object})
UM_Model_04.ENTITYLIST[   21] = Rekesz_01_(#178)  (Rekesz_03_(#181)___{TIn_Object})
UM_Model_04.ENTITYLIST[   22] =   Barack_(#180)  (Rekesz_02_(#159)___{TIn_Object})
UM_Model_04.ENTITYLIST[   23] = Rekesz_03_(#181)  (Rekesz_02_(#159)___{TIn_Object})
Content=[#187, #178, #177]
UM_Model_04.ENTITYLIST[   24] =   Barack_(#182)  (Rekesz_02_(#159)___{TIn_Object})
UM_Model_04.ENTITYLIST[   25] = Rekesz_03_(#183)  (Wrapper11___{TAt_Output_Channel[0]})
Content=[#192, #189, #188]
UM_Model_04.ENTITYLIST[   26] =   Alma_(#185)  (Rekesz_02_(#131)___{TIn_Object})
UM_Model_04.ENTITYLIST[   27] = Rekesz_01_(#186)  (Source0___{TAt_Output_Channel[0]})

```

```

UM_Model_04.ENTITYLIST[ 28] = Rekesz_01_(#187) (Rekesz_03_(#181)___{TIn_Object})
UM_Model_04.ENTITYLIST[ 29] = Rekesz_01_(#188) (Rekesz_03_(#183)___{TIn_Object})
UM_Model_04.ENTITYLIST[ 30] = Rekesz_01_(#189) (Rekesz_03_(#183)___{TIn_Object})
UM_Model_04.ENTITYLIST[ 31] = Alma_ (#190) (Source4___{TAt_Output_Channel[0]})
UM_Model_04.ENTITYLIST[ 32] = Rekesz_02_(#191) (Source1___{TAt_Output_Channel[0]})
UM_Model_04.ENTITYLIST[ 33] = Rekesz_01_(#192) (Rekesz_03_(#183)___{TIn_Object})
UM_Model_04.ENTITYLIST[ 34] = Rekesz_01_(#193) (Source0___{TAt_Output_Channel[1]})
UM_Model_04.ENTITYLIST[ 35] = Rekesz_01_(#194) (Source0___{TIn_Object})

```

UM_Model_04.Print ObjectList Short:

Number of DESObjects = 10

GTime_Now [DDD:HH:MM:SS.XXX] = 0:00:30:30.000

```

=====
UM_Model_04.DESObjectList[ i] = DESObject_Name  DESObject_Type      State      Last_Calculation_Time
DESObject_Content
=====
=====

```

```

=====
UM_Model_04.DESObjectList[ 0] = Sink1          TSINK      TIdle      0:00:28:28.000
>x,x,x,x,x,x>-[x]->nil>
UM_Model_04.DESObjectList[ 1] = Source0         TSOURCE    TBlocked   0:00:29:34.000
>nil>-[#194]->#186,#193,x,x,x,x> (Capacity = 1)
UM_Model_04.DESObjectList[ 2] = Source1         TSOURCE    TIdle      0:00:29:29.000
>nil>-[x]->#191,x,x,x,x,x> (Capacity = 1)
UM_Model_04.DESObjectList[ 3] = Source2         TSOURCE    TBlocked   0:00:29:29.000
>nil>-[x]->x,x,x,x,x,x> (Capacity = 1)
UM_Model_04.DESObjectList[ 4] = Source3         TSOURCE    TBlocked   0:00:29:29.000
>nil>-[x]->x,x,x,x,x,x> (Capacity = 1)
UM_Model_04.DESObjectList[ 5] = Source4         TSOURCE    TBlocked   0:00:30:30.000
>nil>-[x]->#190,x,x,x,x,x> (Capacity = 1)
UM_Model_04.DESObjectList[ 6] = Wrapper01       TWRAPPER   TBlocked   0:00:28:28.000
>{x},{x},{x},{x},{x},{x}>-[x]->#163> (TWrapper_Waiting_for_Sending_Away_Packed_Entities)
UM_Model_04.DESObjectList[ 7] = Wrapper02       TWRAPPER   TBlocked   0:00:29:29.000
>{x},{x},{x},{x},{x},{x}>-[x]->#159> (TWrapper_Waiting_for_Sending_Away_Packed_Entities)

```

UM_Model_04.DESObjectList[Input_Entities#	i]	DESObject_Name	DESObject_Type	Current_Content	Average_Content
Output_Entities#		Average_Staying_Time			
UM_Model_04.DESObjectList[7	0]	Sink1	TSINK	0 [entities]	
0		0:00:00:00.000			
UM_Model_04.DESObjectList[0	1]	Source0	TSOURCE	1 [entities]	
67		0:00:00:24.826			
UM_Model_04.DESObjectList[0	2]	Source1	TSOURCE	0 [entities]	
10		0:00:01:41.000			
UM_Model_04.DESObjectList[0	3]	Source2	TSOURCE	0 [entities]	
19		0:00:00:41.737			
UM_Model_04.DESObjectList[0	4]	Source3	TSOURCE	0 [entities]	
18		0:00:00:40.667			
UM_Model_04.DESObjectList[0	5]	Source4	TSOURCE	0 [entities]	
29		0:00:00:56.933			
UM_Model_04.DESObjectList[20	6]	Wrapper01	TWRAPPER	0 [entities]	
9		0:00:00:00.400			
UM_Model_04.DESObjectList[45	7]	Wrapper02	TWRAPPER	0 [entities]	
8		0:00:01:47.778			
UM_Model_04.DESObjectList[37	8]	Wrapper03	TWRAPPER	1 [entities]	
7		0:00:05:55.000			

```

UM_Model_04.DESObjectList[ 9] = Wrapper11    TWRAPPER    0 [entities]
76          18          0:00:00:02.000

```

UM_Model_04.Print_DESObjectList_Summary_Report (page 2 of 3):

=====

Number of DESObjects = 10

GTime_Now [DDD:HH:MM:SS.XXX] = 0:00:30:30.000

=====

=====

=====

UM_Model_04.DESObjectList[i] = DESObject_Name DESObject_Type in TIdle state [%] in TBusy state [%] in

TBlocked state[%] in TFailed state [%] in TPaused state [%]

=====

=====

=====

=====

=====

=====

UM_Model_04.DESObjectList[0] = Sink1 TSINK 100.00 0.00

0.00 0.00 0.00

UM_Model_04.DESObjectList[1] = Source0 TSOURCE 3.28 0.00

96.72 0.00 0.00

UM_Model_04.DESObjectList[2] = Source1 TSOURCE 63.33 0.00

36.67 0.00 0.00

UM_Model_04.DESObjectList[3] = Source2 TSOURCE 53.33 0.00

46.67 0.00 0.00

UM_Model_04.DESObjectList[4] = Source3 TSOURCE 56.67 0.00

43.33 0.00 0.00

UM_Model_04.DESObjectList[5] = Source4 TSOURCE 6.67 0.00

93.33 0.00 0.00

UM_Model_04.DESObjectList[6] = Wrapper01 TWRAPPER 0.00 6.56

93.44 0.00 0.00

UM_Model_04.DESObjectList[7] = Wrapper02 TWRAPPER 0.00 33.55

66.45 0.00 0.00

UM_Model_04.DESObjectList[8] = Wrapper03 TWRAPPER 0.00 100.00

0.00 0.00 0.00

UM_Model_04.DESObjectList[9] = Wrapper11 TWRAPPER 0.00 40.66

59.34 0.00 0.00

UM_Model_04.Print_DESObjectList_Summary_Report (page 3 of 3):

Number of DESObjects = 0

GTime_Now [DDD:HH:MM:SS.XXX] = 0:00:30:30.000

Occupancy of Content_Entities_Vector

UM_Model_04.DESObjectList[i] = DESObject_Name Oppupancy[%] of Content_Entities_Vector elements

Number_Of_Succesful_Entity_Move_Requests = 185

Number_Of_Source_Call =	292	(36.18 %)
Number_Of_Buffer_Call =	0	(0.00 %)
Number_Of_Machine_Call =	0	(0.00 %)
Number_Of_Sink_Call =	7	(0.87 %)
Number_Of_Wrapper_Call =	508	(62.95 %)
Number_Of_UnWrapper_Call =	0	(0.00 %)
Number_Of_Path_Call =	0	(0.00 %)
Number_Of_Lock_Call =	0	(0.00 %)
Number_Of_UnLock_Call =	0	(0.00 %)

Summa_DESObject_Call = 807 (100.00 %)

Number_Of_All_Objects_Call = 807

Number_Of_All_Entity_Move_Requests = 741

Number_Of_Process_Calculation_Cycles = 0

Number_Of_All_Calculation_Cycles = 1548

Size of SINKED_ENTITYLIST = 112

Last Simulated Calculation Time [DAY:HH:MM:SS.XXX] = 0:00:30:30.000

DESBranch_Simulationtime_End ...[DAY:HH:MM:SS.XXX] = 0:00:30:00.000

Total Real Calculation Time [DAY:HH:MM:SS.XXX] = 0:00:00:00.129

Total Real Program Running Time [DAY:HH:MM:SS.XXX] = 0:00:00:00.161

Run of "DES_Single_DESBranch.py" has finished!

6. A DES Python object's attributes and methods

6.1 TDES_TYPES Python file attributes and methods

In the description, **attributes** appear in red bold, while **methods** appear in blue bold.

This chapter covers the constants and basic data structures and procedures of the DES Python simulation system that are applied in the simulation system.

The description assumes that the reader has a basic knowledge of Python, so the description includes a mix of Python definitions and programs to better understand the concepts.

It helps that the variables in the simulation system are "long-talking English variables".

If the description didn't make it clear what the variable does, maybe the name will help you understand better...

I prefixed the variable names for each object with a specific prefix specific to the object, so the distinction between identical variable names becomes clear.

For example, each object has a name `Name_str` attribute. in the simulation program, DES objects are named => **DESObject_Name_str** Entity names are => **DESEntity_Name_str**, and so on.

Attributes of TDES_TYPES Python file:

These constants can be used to set whether to make copies of Entities that have left the simulation system.

```
#=====
#=====
```

If this global Boolean variable is set to True, then any Entities that have left the system are stored in SINKED_ENTITYLIST.

```
GSINK_Store_Entities_Into_Sinked_EntityList_bool = True
```

If this global Boolean variable is set to False, then Entities in Entities that have left the system (stored) are not stored in SINKED_ENTITYLIST.

```
GSINK_Detailed_Sinked_EntityList_bool = True
```

```
#=====
#=====
```

```
#####
#####
#####
#####
```

```
.class TDESEntity_Position:
```

```
    """
```

This object stores the Entity current position.

```
    """
```

```
    def __init__(self):
        self.X_coordinate = 0.0
        self.Y_coordinate = 0.0
        self.Z_coordinate = 0.0
```

```
#end of class TDESEntity_Position
```

```
#-----
```

```
#####
#####
#####
#####
```

```
.class TDESEntity_Speed:
```

```
    """
```

This object object stores the current speed of the Entity.

```
    """
```

```
    def __init__(self):
        self.into_X_direction = 0.0
        self.into_Y_direction = 0.0
        self.into_Z_direction = 0.0
```

```
#end of class TDESEntity_Speed
```

```
#-----
```

```
#####
#####
#####
#####
```



```

.class TDESEntity_Acceleration:
    """
    This object stores the current acceleration of the Entity.
    """
    def __init__(self):
        self.into_X_direction = 0.0
        self.into_Y_direction = 0.0
        self.into_Z_direction = 0.0

#end of class TDESEntity_Acceleration
#-----

#####
#####
#####
#####
.class TDESObject_Position:
    """
    This object stores the current position of the DES object.
    """
    def __init__(self):
        self.X_coordinate = 0.0
        self.Y_coordinate = 0.0
        self.Z_coordinate = 0.0

#end of class TDESObject_Position
#-----

#####
#####
#####
#####
.class TDESObject_Speed:
    """
    This object stores the current speed of the DES object.
    """
    def __init__(self):
        self.into_X_direction = 0.0
        self.into_Y_direction = 0.0
        self.into_Z_direction = 0.0

#end of class TDESObject_Speed
#-----

#####
#####
#####
#####
.class TDESObject_Acceleration:
    """
    This object stores the current acceleration of the DES object.
    """
    def __init__(self):
        self.into_X_direction = 0.0
        self.into_Y_direction = 0.0
        self.into_Z_direction = 0.0

```

```

#end of class TDESObject_Acceleration
#-----

#####
#####
#####
#####
.class TDES_ID_Number:
    """
    When initializing, the object sets the initial value ID_Number using the self.new_value()
    procedure, and then increments the self each time the procedure is called. Value by
    one(+1).
    """

    def __init__(self, ID_Number_Start_Value):
        self.Value = ID_Number_Start_Value

    def new_value(self):
        self.Value += 1
        if (self.Value == 0):
            self.Value = 1
        #print('self, self.Value =', self, self.Value)

DES_ID_Number = TDES_ID_Number(0)

#end of class TDES_GID_Number
#-----

#####
#####
#####
#####
.class TEnumTuple:
    """
    TEnumTuple stores a tuple object at initialization and sets the initial value (from the
    list) to self.Item_str value to Item_str (string)
    checks whether the Item_str is included in the specified tuple,
    determine the index of Item_str in tuple,
    It gives an error if Item_str is not in the list of string values listed in Tuple.
    """

    def __init__(
        self
        Tuple,
        Init_Item_str
    ):

        self.Tuple = Tuple
        self.Item_str = ''
        self.Item_str_Index = -1
        self.Set_Item_str_to(Init_Item_str)

    def Set_Item_str_to(
        self
        Item_str):

```

```

        if (Item_str in self.Tuple):
            self.Item_str = Item_str
            self.Item_str_Index = self.Tuple.index(Item_str)
        else:
            self.Item_str_Index = -1
            print('')
            print('##### DISCRETE EVENT SIMULATOR ERROR #####')
            print()
            print('*****')
            print('Item_str =', ""+Item_str+"")
            print('*****')
            print()
            print('in tuple ', str(self))
            print('is not element of ' + str(self.Tuple))
            print()
            print('in TEnumTuple.Set_Item_str_to(Item_str) instruction!')
            print()
            print()
            sys.exit() #ez died in (C++)

#end of class TEnumTuple
#-----

#####
#####
TDES_Type_Of_DESObject_tuple = (
    'EMPTY', #=0
    'TENTITY', #=1
    'TSOURCE', #=2
    'TBUFFER', #=3
    'TMACHINE', #=4
    'TSINK', #=5
    'TWRAPPER', #=6
    'TUNWRAPPER', #=7
    'TPATH', #=8
    'TLOCK', #=9
    'TUNLOCK', #=10
)
"""

The TDES_Type_Of_DESObject_tuple defines the types of DES objects in the simulation
system.
"""

# TEST Example:
EnumTuple_TDES_Type_Of_DESObject = \
    TEnumTuple(
        TDES_Type_Of_DESObject_tuple,
        'EMPTY'
    )

#####
#####
TDES_Work_State_tuple = (
    'TIdle', #=0 # The DES object is waiting, working, but has no task.

    'TBusy', #=1 # The DES object is working on the Entity object it contains.

```

```

'TBlocked', #=2      # The DES object has completed its own task, but cannot recreate
                    task because he did not know the Entity within it
                    remove (pass on) the following
                    Object.

'TFailed', #=3       #A DES object cannot work because it has failed.

'TPaused' #=4 #A DES object is workable, but does not perform work and waits,
              to replace a failed DES object
              (warm stand-up mode).
)
"""
The TDES_Work_State_tuple specifies the working states of DES objects in the simulation
system.
"""

```

```

# TEST Example:
EnumTuple_TDES_Work_State = TEnumTuple(
TDES_Work_State_tuple,
'TIdle'
)

```

```

#####
#####

```

```

TDES_Commanded_State_tuple =(
    'TCommanded_Enabled_State', #=0
    'TCommanded_Failed_State', #=1
    'TCommanded_Paused_State' #=2
)
"""

```

```

This is the commanded permission state of the DES object.
A DES object works if
TDES_Commanded_State state = 'TCommanded_Enabled_State', into the other states (with
external assignment)
may be 'TCommanded_Failed_State' based on some malfunction, or
Everything works on it, but it is not allowed to work in 'TCommanded_Paused_State'!
"""

```

```

# TEST Example:
EnumTuple_TDES_Commanded_State = \
    TEnumTuple(
        TDES_Commanded_State_tuple,
        'TCommanded_Enabled_State'
    )

```

```

#####
#####

```

```

TDES_Status_Time_Parameters =[
    0.0, # Idle, #=0
    0.0, # Busy, #=1
    0.0, # Blocked, #=2
    0.0, # Failed, #=3
    0.0, # Paused, #=4
]

```

```

"""

```

This is a vector of the simulation durations of the DES object spent in different working states.
 """

 #####

TDES_Command_To_DESObject_tuple =(
 'TDESOBJECT_Next_State', #=0 Examine the Input Channels
 (Do they have an Entity?)
 Updates the state of the DES object.
 Populates the output channel to the emitted
 Entity.

'TENTITY_Move_Request', #=1 Passes to the next DES object the
 Entity.

'TPROCESS_Calculating', #=2 Inviting the DES_Object's own procedures.

'TSTOP_Executing' #=3 End (stop) the simulation program.
)

"""

These are instructions that can be given to the DES object.

"""

TEST Example:
 EnumTuple_TDES_Command_To_DESObject =\
 TEnumTuple(
 TDES_Command_To_DESObject_tuple,
 'TDESOBJECT_Next_State'
)

 #####

TDES_Entity_Position_In_DESObject_tuple = (
 'TAt_Input_Channel', #=0
 'TIn_Object', #=1
 'TAt_Output_Channel' #=2
)

"""

This is the position of the Entity in the DES object.

"""

TEST Example:
 EnumTuple_TDES_Entity_Position_In_DESObject =\
 TEnumTuple(
 TDES_Entity_Position_In_DESObject_tuple,
 'TIn_Object'
)

 #####

```

TDES_Distribution_tuple =(
    'TDistribution_Constant_Value', #=0
    'TDistribution_Exponential_Mean', #=1
    'TDistribution_Normal_Mean_Deviation', #=2
    'TDistribution_Triangle_Minimum_Usual_Maximum', #=3
    'TDistribution_Uniform_Minimum_Maximum', #=4
    'TDistribution_External', #=5
)

```

"""

These are types of DES object *distribution functions* .

"""

```

# TEST Example:
EnumTuple_TDES_Distribution =\
    TEnumTuple(
        TDES_Distribution_tuple,
        'TDistribution_Constant_Value'
    )

```

#####

```

TDES_Queue_Type_tuple =(
    'TQueue_First_In_First_Out',           #=0 FIFO
    'TQueue_Last_In_First_Out',           #=1 LIFO
    'TQueue_Entity_With_Lowest_Priority_Value', #=2
    'TQueue_Entity_With_Highest_Priority_Value', #=3
    'TQueue_Entity_With_BUFFER_Match_Value' #=4
)

```

"""

These are the configurable types of the internal Entity Queue of the DES object.

"""

```

# TEST Example:
EnumTuple_TDES_Queue_Type =\
    TEnumTuple(
        TDES_Queue_Type_tuple,
        'TQueue_First_In_First_Out'
    )

```

#####

```

TDES_Channel_Type_tuple =(
    'TChannel_Input', #=0
    'TChannel_Output' #=1
)

```

"""

These are possible types of channels for the DES object.

"""

```

# TEST Example:
EnumTuple_TDES_Channel_Type =\
    TEnumTuple(
        TDES_Channel_Type_tuple,

```

```

        'TChannel_Input'
    )

#####
#####
TDES_Channel_Index_Selection_Strategy_tuple =(
    'TSelection_Constant_Index', #=0 (I/O)
    'TSelection_Random_Selected_Index', #=1 (I/O)
    'TSelection_Cyclical_Selected_Index', #=2 (I/O) Round Robin type selection
    'TSelection_First_Available_Index_Start_From_First_Index', #=3 (I/O)
    'TSelection_First_Available_Index_Start_From_Last_Index_From_Back', #=4 (I/O)

    # DESAttribute_Name_str is "Selected_InputChannel_Index" or
    "Selected_OutputChannel_Index"
    'TSelection_By_DESObject_User_Attribute', #=5 (I/O)

    'TSelection_By_Channel_Ratio_Values', #=6 (I/O)
    'TSelection_by_External_Selected_Index', #=7 (I/O)
    'TSelection_by_TIdle_State_Of_Connected_DESObject', #=8 (only at Output)
    'TSelection_by_DESEntity_Priority_Value', #=9 (only at Output of TBUFFER)
    'TSelection_by_DESEntity_Given_Name_str', #=10 (only at Output)
)

"""
These are the DES object channel index selection strategies.
(I/O) = means that the strategy can be applied to input and output channel index
selection.
"""

# TEST Example:
EnumTuple_TDES_Channel_Index_Selection_Strategy =\
    TEnumTuple(
        TDES_Channel_Index_Selection_Strategy_tuple,
        'TSelection_Constant_Index'
    )

```

```
#####
#####
TDES_Wrapper_Step_Sequence_tuple =(
    'TWrapper_Waiting_for_Package', #=0
    'TWrapper_Package_is_Arrived', #=1
    'TWrapper_Waiting_for_Packing_Entities', #=2
    'TWrapper_All_Packing_Entity_is_Arrived', #=3
    'TWrapper_Waiting_for_Sending_Away_Packed_Entities', #=4
    'TWrapper_Package_Went_Away', #=5
)

"""
These are the TWRAPPER DES object operating states when Entities are packaged.
"""

# TEST Example:

# TEST Example:
EnumTuple_TDES_Wrapper_Step_Sequence =\
    TEnumTuple(
        TDES_Wrapper_Step_Sequence_tuple,
        'TWrapper_Waiting_for_Package'
    )

#####
#####
TDES_UnWrapper_Step_Sequence_tuple =(
    'TUnWrapper_Waiting_for_Packed_Object', #=0
    'TUnWrapper_Object_is_Arrived', #=1
    'TUnWrapper_UnPack_Objects_Into_Buffer', #=2
    'TUnWrapper_Waiting_for_Sending_Away_Objects', #=3
    'TUnWrapper_Objects_Went_Away' #=4
)

"""
These are the operational states of the TUNWRAPPER DES object when Dispacking Entities.
"""

# TEST Example:
EnumTuple_TDES_UnWrapper_Step_Sequence =\
    TEnumTuple(
        TDES_UnWrapper_Step_Sequence_tuple,
        'TUnWrapper_Waiting_for_Packed_Object'
    )

#####
#####
TDES_Entity_Or_TDES_Object_tuple =(
    'TDES_ENTITY_type', #=0
    'TDES_OBJECT_type' #=1
)

"""
These are the types of objects that implement entity storage in DES Python.
"""
```



```

# TEST Example:
EnumTuple_TDES_Entity_Or_TDES_Object =\
    TEnumTuple(
        TDES_Entity_Or_TDES_Object_tuple,
        'TDES_ENTITY_type'
    )

#####
#####
# Used by the class of TDES_OBJECT
.class TDES_OBJECT_SYSTEM_ATTRIBUTE:
    """
    """
    The TDES_OBJECT object is a system attribute.
    It contains statistical data about the object determined during the simulation.
    The attribute value can only be changed by the simulation system!
    """

The system attribute of the object "TDES_OBJECT".
It contains statistical data about the object determined during the simulation.
The attribute value can only be changed by the simulation system!
    """
    def __init__(self):
        self.DESAttribute_Name_str = '' # index=0
        self.DESAttribute_Value_str = '' # index=1

#end of class TDES_OBJECT_SYSTEM_ATTRIBUTE
#-----

#####
#####
# Used by the class of TDES_OBJECT
.class TDES_OBJECT_USER_ATTRIBUTE:
    """
    """
    The user attribute of the TDES_OBJECT object.
    Contains user-defined information about the object.
    The value of the attribute can be freely changed by the user!
    """
    def __init__(self):
        self.DESAttribute_Name_str = '' # index=0
        self.DESAttribute_Value_str = '' # index=1

#end of class TDES_OBJECT_USER_ATTRIBUTE
#-----

#####
#####
#### SystemAttributeVector of TDES_OBJECT_SYSTEM_ATTRIBUTE objects
TDES_Object_System_AttributeVector = [] # Contains TDES_OBJECT_SYSTEM_ATTRIBUTE type
object(class).

#### UserAttributeVector of TDES_OBJECT_USER_ATTRIBUTE objects

```

TDES_Object_User_AttributeVector = [] # Contains TDES_OBJECT_USER_ATTRIBUTE type object(class).

```
#####
#####
# Used by the class of TDES_ENTITY
.class TDES_ENTITY_SYSTEM_ATTRIBUTE:
    """
    The TDES_ENTITY object is a system attribute.
    It contains statistical data about the object determined during the simulation.
    The attribute value can only be changed by the simulation system!
    """
    def __init__(self):
        self.DESAttribute_Name_str = '' # index=0
        self.DESAttribute_Value_dbl = 0.0 # index=1
        self.DESAttribute_Value_str = '' # index=2

#end of class TDES_ENTITY_SYSTEM_ATTRIBUTE
#-----
```

```
#####
#####
# Used by the class of TDES_ENTITY
.class TDES_ENTITY_HYSTORICAL_SYSTEM_ATTRIBUTE:
    """
    The TDES_ENTITY object is a system attribute.
    During the simulation, it contains the stations of the route of the object "TDES_ENTITY".
    The attribute value can only be changed by the simulation system!
    """
    def __init__(self):
        self.DESAttribute_Name_str = '' # index=0
        self.DESAttribute_Name_Version_int = 0 # index=1
        self.DESAttribute_Value_str = '' # index=2

#end of class TDES_ENTITY_HYSTORICAL_SYSTEM_ATTRIBUTE
#-----
```

```
#####
#####
# Used by the class of TDES_ENTITY
.class TDES_ENTITY_USER_ATTRIBUTE:
    """
    The user attribute of the TDES_ENTITY object.
    Contains user-defined information about the object.
    The value of the attribute can be freely changed by the user!
    """
    def __init__(self):
        self.DESAttribute_Name_str = '' # index=0
        self.DESAttribute_Value_str = '' # index=1

#end of class TDES_ENTITY_USER_ATTRIBUTE
#-----
```


Methods of TDES_TYPES Python file are:

```
#####
#####
def DES_Upper_Case_str (
    input_str

    #Python Output:
    # return upper_case_str
    ):
    """
Replace letter characters in input_str variables with uppercase letters.
    """

#.....
# Python program elements
#.....

#end of def DES_GUpper_Case_str
#-----

#####
#####
def DES_Str_To_Int(
    input_str

    # Python Output:
    # return int(input_str)
    ):
    """
Converts number characters in input_str variables to integers.
    """

#.....
# Python program elements
#.....

#end of def DES_GStr_To_Int
#-----

#####
#####
def DES_Int_To_Str (
    number_int

    # Python Output:
    # return str(number_int)
    ):
    """
The input parameter converts number_int value of an integer variable into a sequence of
ASCII characters
Converts.
    """

#.....
# Python program elements
#.....
```

```

#end of def DES_GInt_To_Str
#-----

#####
#####
def DES_Str_To_Float(
    input_str

    # Python Output:
    # return float(input_str)
    ):
    """
    Converts the value of the variable input_str(string) specified as an input parameter to a
    floating-point number.
    """

    #.....
    # Python program elements
    #.....

#end of def DES_GStr_To_Float
#-----

#####
#####
def DES_Float_To_Str(
    number_float

    # Python Output:
    # return str(number_float)
    ):
    """
    Converts the value of the input parameter number_float variable to a sequence of ASCII
    characters.
    """

    #.....
    # Python program elements
    #.....

#end of def DES_GFloat_To_Str
#-----

#####
#####
def DES_Boolean_To_Str(
    input_bool

    # Python Output:
    # return str(input_bool)
    ):
    """
    The value of the input_bool variable specified as an input parameter is converted to
    ASCII characters. [True, False]
    """

    #.....

```

```

# Python program elements
#.....

#end of def DES_GBoolean_To_Str
#-----

#####
#####
def DES_Str_To_Boolean(
    input_str

    # Python Output:
    # return result_bool
    ):
    """
    Converts the value of the input_bool variable specified as an input parameter to a
    Boolean value [True, False].
    """

#.....
# Python program elements
#.....

#end of def DES_GStr_To_Boolean
#-----

#####
#####
def clear_space_chars(
    input_str

    # Python Output:
    # return result_str
    ):
    """
    The input_str variable specified as input parameters deletes the 'space' characters from
    its contents.
    """

#.....
# Python program elements
#.....

#end of def clear_space_chars
#-----

```

```
#####
#####
def clear_tab_chars(
    input_str

    # Python Output:
    # return result_str
    ):
    """
    Deletes 'tab' characters from the contents of the input_str variable specified as input
    parameters.
    """

    #.....
    # Python program elements
    #.....

#end of def clear_tab_chars
#-----

#####
#####
def clear_coma_chars(
    input_str

    # Python Output:
    # return result_str
    ):
    """
    Deletes 'coma' (single string sign (')) from the contents of the input_str variable
    specified as input parameters.
    """

    #.....
    # Python program elements
    #.....

#end of def clear_coma_chars
#-----

#####
#####
def clear_double_coma_chars(
    input_str

    # Python Output:
    # return result_str
    ):
    """
    Deletes 'double_coma'(double string sign (")) from the contents of the input_str variable
    specified as input parameters.
    """

    #.....
    # Python program elements
    #.....

    #end of def clear_double_coma_chars
#-----
```

```

#####
#####
def clear_crlf_chars(
    input_str

    # Python Output:
    # return result_str
    ):
    """
    Deletes the 'crlf' characters from the contents of the input_str variable specified as
    input parameters.
    """

#.....
# Python program elements
#.....

#end of def clear_crlf_chars
#-----

#####
#####
def clear_not_number_chars(
    input_str,

    # Python Output:
    # return result_str
    ):
    """
    Deletes NONNUMERIC characters from the contents of the input_str variable specified as
    input parameters.
    """

#.....
# Python program elements
#.....

#end of def clear_crlf_chars
#-----

import random
#####
#####
# Random Number (Uniform Distribution between [0.0 .. 1.0])
def DES_Random_Number(

    # Python Output:
    # return random.random()
    ):
    """
    This procedure generates a random number between 0.0 and 1.0.
    """

#.....
# Python program elements

```



```

#.....

#end of def DES_GRandom_Number
#-----

#####
#####
# Constant Distribution
def DES_Constant_Distribution(
    Constant,

    # Python Output:
    # return constams_distribution_value_float
    ):
    """
    This procedure implements the constant-valued cumulative distribution function specified
    by the Constant parameter.
    """

#.....
# Python program elements
#.....

#end of def DES_GConstant_Distribution
#-----

#####
#####
# Exponential Distribution
def DES_Exponential_Distribution(
    Mean,

    # Python Output:
    # return exponential_distribution_value_float
    ):
    """
    The procedure returns the current exponential distribution specified by the Mean
    parameter.
    """

#.....
# Python program elements
#.....

    #end of def DES_GExponential_Distribution
#-----

#####
#####
# Normal Distribution
def DES_Normal_Distribution(
    Mean, # average
    Sigma, # scatter

    # Python Output:
    # return normal_distribution_value_float

```

```

        ):
        """
This procedure returns the current normal distribution specified by the parameters
Mean(mean) and Sigma(standard deviation).
        """

#.....
# Python program elements
#.....

#end of def DES_GNormal_Distribution
#-----

#####
#####
# Triangle Distribution
def DES_Triangular_Distribution(
    Minimum
    Usual,
    At the most

    # Python Output:
    # return triangular_distribution_value_float
    ):
    """
This procedure returns the current value of the triangle distribution specified by the
parameters Minimum, Usual, and Maximum.
    """

#.....
# Python program elements
#.....

#end of def DES_GTriangular_Distribution
#-----

#####
#####
# Uniform Distribution
def DES_Uniform_Distribution(
    Minimum
    At the most

    # Python Output:
    # return uniform_distribution_value_float
    ):
    """
This procedure returns the current value of the uniform distribution specified by the
Minimum(minimum) and Maximum(maximum) parameters.
    """

#.....
# Python program elements
#.....

#end of def DES_GUniform_Distribution
#-----

```

```
#####
#####
# Weibull Distribution
def DES_Weibull_Distribution(
    Alpha
    beta,

    # Python Output:
    # return weibull_distribution_value_float
    ):
    """
    This procedure returns the current value of the Weibull distribution specified by the
    alpha(scale) and beta(shape) parameters.
    """

    #.....
    # Python program elements
    #.....

#end of def DES_Weibull_Distribution
#-----

#####
#####
def DES_Create_Text_Chain_str(
    Number_Of_Text_Element,
    Text_str

    # Python Output:
    # return result_str
    ):
    """
    This procedure creates a string of characters specified by the Number_Of_Text_Element
    (number of elements) and Text_str (text string) parameters.
    """

    #.....
    # Python program elements
    #.....

#end of def DES_GCreate_Text_Chain_str
#-----
```

```
#####
#####
def DES_Command_To_Object_To_Str(
    Command_To_Object_Item,

    # Python Output:
    # return result_str
    ):
    """
    This procedure generates a character equivalent value for the parameter
    Command_To_Object_Item (statement for DESObject).
    """

    #.....
    # Python program elements
    #.....

#end of def DES_GCommand_To_Object_To_Str
#-----
```

```
#####
#####
def DES_Distribution_To_Str(
    Distribution_Item

    # Python Output:
    # return result_str
    ):
    """
    The procedure generates a character equivalent value for the parameter
    Distribution_Item(distribution type).
    """

    #.....
    # Python program elements
    #.....

#end of def DES_GDistribution_To_Str
#-----
```

```
#####
def DES_Commanded_State_To_Str(
    Commanded_State_Item

    # Python Output:
    # return result_str
    ):
    """
    This procedure generates a character equivalent value for the Commanded_State_Item
    (commanded DES Object State) parameter.
    """

    #.....
    # Python program elements
    #.....

#end of def DES_GCommanded_State_To_Str
#-----
```

```
#####
#####
def DES_Type_Of_Object_To_Str(
    Type_Of_DESObject_Item

    # Python Output:
    # return result_str
    ):
    """
    This procedure generates a character corresponding value for the parameter
    Type_Of_DESObject_Item (the type of DES object).
    """

    #.....
    # Python program elements
    #.....

#end of def DES_GType_Of_Object_To_Str
#-----

#####
#####
def DES_Queue_Type_To_Str(
    Queue_Type_Item

    # Python Output:
    # return result_str
    ):
    """
    This procedure creates a character equivalent value for the parameter
    Queue_Type_Item(type of queue in BUFFER DES object).
    """

    #.....
    # Python program elements
    #.....

    #end of def DES_GQueue_Type_To_Str
#-----

#####
#####
def DES_Wrapper_Step_To_Str(
    WrapperSequence_Item

    # Python Output:
    # return result_str
    ):
    """
    This procedure returns a character corresponding value for the parameter
    WrapperSequence_Item (names of states in the DES object wrapper).
    """

    #.....
    # Python program elements
    #.....
```

```

#end of def DES_GWrapper_Step_To_Str
#-----

#####
#####
def DES_UnWrapper_Step_To_Str(
    UnWrapperSequence_Item

    # Python Output:
    # return result_str
    ):
    """
    This procedure returns a character corresponding value for the parameter
    UnWrapperSequence_Item (names of states of the UNWRAPPER DES object).
    """

#.....
# Python program elements
#.....

#end of def DES_GUnWrapper_Step_To_Str
#-----

#####
#####
def DES_Work_State_To_Str(
    Work_State_Item

    # Python Output:
    # return result_str
    ):
    """
    This procedure generates the correct value for the parameter Work_State_Item(DESObject
    (working states)).
    """

#.....
# Python program elements
#.....

#end of def DES_GWork_State_To_Str
#-----

#####
#####
def DES_Channel_Type_To_Str(
    Channel_Type_Item

    # Python Output:
    # return result_str
    ):
    """
    This procedure creates a character equivalent value for the parameter Channel_Type_Item
    (the type of channel in the DES object).
    """

```

```

        """

#.....
# Python program elements
#.....

#end of def DES_GChannel_Type_To_Str
#-----

#####
#####
def DES_Channel_Index_Selection_Strategy_To_Str(
    ChannelStrategy_Item

    # Python Output:
    # return result_str
    ):
    """
    This procedure generates a character corresponding value for the parameter
    ChannelStrategy_Item (DES object channel selection strategy).
    """

#.....
# Python program elements
#.....

#end of def DES_GChannel_Index_Selection_Strategy_To_Str
#-----

#####
#####
def DES_Entity_Position_In_DESObject_To_Str(
    Entity_Position_Item

    # Python Output:
    # return result_str
    ):
    """
    This procedure generates a character equivalent value for the parameter
    Entity_Position_Item (the location of the entity in a DES object).
    """

#.....
# Python program elements
#.....

#end of def DES_GEntity_Position_In_DESObject_To_Str
#-----

#2019-04-02
#####
#####
def DES_Justify_String_Field_to_LEFT_str(
    Value_str,
    Field_Width_int,

```

```

    # Python Output:
    # return result_str
    ):
    """
The procedure is left-aligned in the specified field width to enter the value of the
Value_str.
    """

#.....
# Python program elements
#.....

#end of def DES_GJustify_String_Field_to_LEFT_str
#-----

#####
#####
def DES_Justify_String_Field_to_RIGHT_str(
    Value_str,
    Field_Width_int,

    # Python Output:
    # return result_str
    ):
    """
The procedure right-aligns the specified field width to enter the value of the Value_str.
    """

#.....
# Python program elements
#.....

#end of def DES_GJustify_String_Field_to_RIGHT_str
#-----

```



```
#####
#####
def days(
    days_float,

    # Python Output:
    # return days_in_seconds
    ):
    """
```

The procedure converts the day (days_float) value specified by the input parameter to seconds.

```
    """
```

```
#.....
# Python program elements
#.....
```

```
#end of def days
```

```
#-----
```

```
#####
#####
def hours(
    hours_float,

    # Python Output:
    # return hours_in_seconds
    ):
    """
```

The procedure converts the hour value (hours_float) specified by the input parameter to the second value.

```
    """
```

```
#.....
# Python program elements
#.....
```

```
#end of def hours
```

```
#-----
```

```
#####
#####
def minutes(
    minutes_float,

    # Python Output:
    # return minutes_in_seconds
    ):
    """
```

The procedure converts the minute value (minutes_float) specified by the input parameter to the second value.

```
    """
```

```
#.....
# Python program elements
#.....
```

```
#end of def minutes
```

```
#-----
```

```
#####
#####
def seconds(
    seconds_float,

    # Python Output:
    # return seconds_in_seconds #(Hi!)
    ):
    """
The procedure converts the second value (seconds_float) specified by the input parameter
to the second value.
    """

#.....
# Python program elements
#.....

#end of def seconds
#-----

#####
#####
def km_per_hour_to_m_per_sec(
    km_per_hours_float,

    # Python Output:
    # return meter_per_second # (m/s)
    ):
    """
The procedure converts the km/hour value specified by the input parameter to meters per
second.
    """

#.....
# Python program elements
#.....

#end of def km_per_hour_to_m_per_sec
#-----

#####
#####
def m_per_sec_to_km_per_hour(
    meter_per_second_float,

    # Python Output:
    # return km_per_hour # (km/h)
    ):
    """
This procedure converts the metre/second value specified by the input parameter to km/h.
    """

#.....
# Python program elements
#.....

#end of def m_per_sec_to_km_per_hour
```

```
#-----

#####
#####
def route_calculation(
    velocity_float, # [m/s]
    route_time_float, # [s]

    # Python Output:
    # return route_float # (m)
    ):
    """
    The procedure determines the value of route_float [m] from the velocity_float and
    route_time_float values specified by the input parameter.
    """

#.....
# Python program elements
#.....

#end of def route_calculation
#-----

#####
#####
def route_time_calculation(
    route_float, # [m]
    velocity_float, # [m/s]

    # Python Output:
    # return route_time_float # (s)
    ):
    """
    The procedure determines the value of route_time_float [m] from the velocity_float and
    route_float values specified by the input parameter.
    """

#.....
# Python program elements
#.....

#end of def route_time_calculation
#-----

#####
#####
def velocity_calculation(
    route_float, # [m]
    route_time_float, # [s]

    # Python Output:
    # return velocity_float # m/(s)
    ):
    """
    The procedure determines the value of velocity_float [m/s] from the route_float and
    route_time_float values specified by the input parameter.
    """
```

```

        """

#.....
# Python program elements
#.....

#end of def velocity_calculation
#-----

#####
#####
def DES_Date_Int_To_Str(
    number_int

    # Python Output:
    # return number_str
    ):
    """
    The procedure determines the string value of the specified integer.
    If the number is less than 10, complete it with a leading character "0".
    """

#.....
# Python program elements
#.....

#end of def DES_Date_Int_To_Str
#-----

#####
#####
def DES_Seconds_to_Days_Hours_Minutes_Seconds_str(
    seconds_float

    # Python Output:
    # return [date_str, Days, Hours, Minutes, Seconds]
    ):
    """
    The procedure determines the number of days(DAY), hours(MM), minutes(MM), and
    seconds(SS.XXX) that you specify in seconds.
    The result is 'DAY:HH:MM:SS. XXX' format (date_str).
    """

#.....
# Python program elements
#.....

#end of def DES_GSeconds_to_Days_Hours_Minutes_Seconds_str
#-----

#####
#####
def DES_Days_Hours_Minutes_Seconds_to_Seconds(
    date_str

    # Python Output:

```

```
        # return time_in_seconds
    ):
    """
    This procedure determines the total number of seconds for the specified day(DAY),
    hour(MM), minute(MM), and second(SS.XXX) values.
    The result time_in_seconds floating point number.
    """

    #.....
    # Python program elements
    #.....

    #end of def DES_Days_Hours_Minutes_Seconds_to_Seconds
    #------
```

6.2 TDES_TASK object attributes and methods

In the description, **attributes** appear in red bold, while **methods** appear in blue bold.

The TDES_TASK object has no methods!

The task of the TDES_TASK object is:

The **TDES_TASK object** is the task object of *the DES Python simulation system*. The following tasks are currently implemented in DES Python:

TDESOBJECT_Next_State

- Examine the Input Channels for Entities. If there is an Entity in the input channels, it reads (them).
- Updates the state of the DES object. Executes the operating algorithm of the DES object.
- Populates the Output Channel with the emitted Entity.

TENTITY_Move_Request

- Moves the Entity to the next DES object with parameters defined by a relationship object.

TPROCESS_Calculating

- Inviting the TDES_OBJECT to its own procedures, which are:
 - DESBranch_ON_AFTER_ENTITY_ENTERED_into_InputChannel_of_DESObject
executed when the Entity enters the input channel of the DES object.
 - DESBranch_ON_AFTER_ENTITY_ENTERED_into_DESObject
that is executed when the Entity enters the DES object.
 - DESBranch_ON_BEFORE_ENTITY_EXITED_from_DESObject
that is executed when the Entity has just exited the DES object.
 - DESBranch_ON_AFTER_ENTITY_ENTERED_into_OutputChannel_of_DESObject
is executed when the Entity enters the output channel of the DES object.

TSTOP_Executing

- End (stop) the simulation program.

The TDES_TASK object can be sent by any DES object in a simulation system. A DES object can submit a job to another DES object or to itself.

The TDES_TASK object is placed in a task list that stores tasks sorted in ascending order by execution time. We always execute the current task (with the lowest execution time) in the next simulation step.

Therefore, the most important parameters of the task object are to specify when and what task should be performed during the simulation!

Of course, another important parameter is which DES object sends the command. The DES object is identified by the **branch** (**DESBranch_Name_str**) and **DES object** (**DESOBJECT_Name_str**) names. With these two parameters, similarly to family names, we can specify by which last name (DESBranch_Name_str) and by what first name (DESOBJECT_Name_str) we can identify DES objects. The content of DESOBJECT_Name_str is called unique name, which is a name that can occur only once in the simulation branch (TDES_BRANCH).

To define the TDES_TASK object:

To create an object of type TDES_TASK in DES Python, do the following:

```
LTask = TDES_TASK()
```

Attributes of the TDES_TASK object:**List of attributes of TDES_TASK**

```
class TDES_TASK
    self.DESTask_Owner_class

    self.DESTask_Generated_Time_Of_Task
    self.DESTask_Time_Of_Task
    self.DESTask_Command_To_Object

    self.DESTask_DESBranch_class
    self.DESTask_Branch_Name_str

    self.DESTask_Sender_class
    self.DESTask_Sender_Name_str

    self.DESTask_Sender_ChannelIndex_OUT

    self.DESTask_Function_Name_str
    self.DESTask_Function_Parameter01_dbl
    self.DESTask_Function_Parameter02_str
    self.DESTask_Function_Parameter03_str

#####
#####
#####
#####
# Task object sent by DESObject
.class TDES_TASK:
    """
The TDES_TASK object stores the tasks of the simulation system, which the TDES_OBJECT
send to each other and to themselves.
    """

#####
#####
#####
#####
By "rewriting" the __str__(self) procedure, instead of the technical parameters
of the object, another DES_Task form of output can be created.

    def __str__(self):
        return 'DESTask_Time_Of_Task = '+f"{self.DESTask_Time_Of_Task}"

#end of def __str__
```



```
#-----
#####
#####
def __init__(self):

# ~~~~~&&
The owner object of the TDES_TASK object. Tasks are stored in the task list
structure, which is stored in the TDES_BRANCH object. So, the owner object of the job
is the branch (TDES_BRANCH) object.
self.DESTask_Owner_class = None

# ~~~~~&&
The simulation time at which the job was created. We don't use it in the program yet!
It records when the Task was created (simulation time).
self.DESTask_Generated_Time_Of_Task =0.0

# ~~~~~&&
The simulation time of the execution of the task in the simulation system.
self.DESTask_Time_Of_Task =0.0

# ~~~~~&&
"""
TDES_Command_To_DESObject_tuple =(
'TDESOBJECT_Next_State', #=0
'ENTITY_Move_Request', #=1
'TPROCESS_Calculating', #=2
'TSTOP_Executing' #=3
"""
The name of the task to be performed at the specified simulation time.
self.DESTask_Command_To_Object =\
    TEnumTuple(
        TDES_Command_To_DESObject_tuple,
        'TDESOBJECT_Next_State'
    )

# ~~~~~&&
The owner object (TDES-BRANCH object) of the TDES_OBJECT sending the command.
self.DESTask_DESBranch_class = None

Name the owner object of the TDES_OBJECT that sent the command.
self.DESTask Branch Name str ='NAME OF DES BRANCH'
```

```
# ~~~~~
The DES object (class) that sent the command.
self.DESTask_Sender_class = None
```

```
Name the DES object that sent the command.
self.DESTask_Sender_Name_str = 'NAME_OF_SENDER_OBJECT'
```

```
# ~~~~~
The output channel index of the DES object that sent the command.
self.DESTask_Sender_ChannelIndex_OUT = 0 # FROM
```

```
# ~~~~~
Parameters that can be set when executing the 'TPROCESS_Calculating' command
self.DESTask_Function_Name_str = 'aaa'
self.DESTask_Function_Parameter01_dbl = 0.0
self.DESTask_Function_Parameter02_str = ''
self.DESTask_Function_Parameter03_str = ''
```

```
#end of def __init__
#-----
```

```
#end of class TDES_TASK
#-----
#-----
#-----
#-----
```

6.3 **TDES_CHANNEL** object attributes and methods

In the description, **attributes** appear in red bold, while **methods** appear in blue bold.

The TDES_CHANNEL object has no methods!

The task of the TDES_CHANNEL object is:

The **TDES_CHANNEL** object is the input and output relationship object for DES objects in the DES Python simulation system. This object temporarily stores (as an output object) and receives (as an input object) Entity objects in the simulation system.

The **TDES_CHANNEL** object can store one Entity.

The **TDES_CHANNEL** object is the owner object of the **TDES_OBJECT**, which means that without the **TDES_OBJECT** this object cannot function.

The name of the **TDES_CHANNEL** object **DESChannel_Name_str** or a name that can be given by the user and closely related to the operation of a specific system DESChannel_Caption_str. However, these are less commonly used because channels are usually referred to as the i^{th} input channel or j^{th} output channel of a DES object.

To define the TDES_CHANNEL object:

To create an object of type TDES_CHANNEL in DES Python, do the following:

```
LChannel = TDES_CHANNEL()
```

An output **TDES_CHANNEL** can use the **TDES_CONNECT** object to connect to an input **TDES_CHANNEL**. Therefore, when uploading the data necessary for the operation of the program, each **TDES_CHANNEL** contains the most important parameters of the related **TDES_CHANNEL**.

Attributes of the TDES_CHANNEL object:**List of attributes of TDES_CHANNEL**

```

class TDES_CHANNEL
    self.DESChannel_Owner_class
    self.DESChannel_Data_class

    self.DESChannel_Name_str
    self.DESChannel_Caption_str

    self.DESChannel_Entity_Given_Name_to_Selection_str

    self.DESChannel_Type
    self.DESChannel_Is_Connected_bool
    self.DESChannel_Is_Enabled_In_PreviousStep_bool
    self.DESChannel_Is_Enabled_bool

    self.DESChannel_Selection_Ratio_Value

    self.DESChannel_Number_Of_Entities_Flown_Through
    self.DESChannel_Priority_Of_Channel_Service

    self.DESChannel_Connected_DES_CHANNEL_class
    self.DESChannel_Connected_DESObject_ChannelType

    self.DESChannel_Connected_DESBranch_Name_str
    self.DESChannel_Connected_DESBranch_class
    self.DESChannel_Connected_DESObject_Name_str
    self.DESChannel_Connected_DESObject_class
    self.DESChannel_Connected_DESObject_Channel_Index

```

```

#####
#####
#####
#####

```

```

.class TDES_CHANNEL:
    """

```

```

The TDES_CHANNEL object implements the input and output channels of the TDES_OBJECT.
    """

```

```

#####
#####

```

```

    def __str__(self):

```

```

        Output_str = '' + f"{self.DESChannel_System_Name_str}" + ' '

```

```

        return Output_str

```

```

#end of def __str__

```

```

#-----
#-----

```

```
#####
#####
def __init__(
    self
):
    """
    """
```

The owner object of the TDES_CHANNEL object (a pointer to an TDES_OBJECT object)

```
self.DESChannel_Owner_class = None
```

The data value of the TDES_CHANNEL object. A value pointing to TDES_ENTITY in the channel.

```
self.DESChannel_Data_class = None
```

Name the TDES_CHANNEL object.

```
self.DESChannel_Name_str = 'DESCANNEL_SYSTEM_NAME_STR'
```

User naming of the TDES_CHANNEL object. This name is closely related to the role of the object in a particular system. It is profession-specific and primarily serves users of the simulation system to promote a better understanding of the simulation system.

```
self.DESChannel_Caption_str = 'CAPTION_OF_CHANNEL'
```

The name Entity applied to select the TDES_CHANNEL object.

Some channel (TDES_CHANNEL) selection strategies are where the output channel is selected based on the entity name (naming). This attribute specifies the Entity name (DESEntity_Name_str) by which the output feed index is selected.

```
self.DESChannel_Entity_Given_Name_to_Selection_str =
'ENTITY_GIVEN_NAME_AT_SELECTION_STR'
```

```
#-----
# TDES_Channel information:
#=====

    """
TDES_Channel_Type_tuple =(
    'TChannel_Input', #=0
    'TChannel_Output' #=1
)
    """
```

Type of TDES_CHANNEL object. We can use this attribute to set whether the channel is an input or output channel.

```
self.DESChannel_Type = TEnumTuple(
    TDES_Channel_Type_tuple,
    'TChannel_Input')
```

A Boolean value that specifies whether the TDES_CHANNEL object is connected to another channel.

```
self.DESChannel_Is_Connected_bool = False
```

This attribute specifies whether the TDES_CHANNEL object was enabled in the previous simulation step.

True = channel open # Allows(releases) Entities into (from) channel.

False = channel closed # Entity should wait at channel entry point or sewer.)

```
self.DESChannel_Is_Enabled_In_PreviousStep_bool = True
```

This attribute specifies whether the TDES_CHANNEL object is allowed.

True = channel open # Allows(releases) Entities into (from) channel.

False = channel closed # Entity should wait at channel entry point or sewer.)

```
self.DESChannel_Is_Enabled_bool = True
```

The ratio of the selection of the TDES_CHANNEL object (it can be any positive real value).

Output channel index selection strategy that works based on the ratio specified for each channel.

```
self.DESChannel_Selection_Ratio_Value = 0.0
```

The number of TDES_ENTITY objects that passed through the TDES_CHANNEL object.

```
self.DESChannel_Number_Of_Entities_Flowed_Through = 0
```

The priority value of the TDES_CHANNEL object, which is applied when you want to prioritize channels in DESObject.

The priority value is a positive real number, which the higher the value, the more important the channel.

```
self.DESChannel_Priority_Of_Channel_Service = 0
```

```
#-----
```

```
#+++++
```

```
# Connected TDES_CHANNEL information:
```

```
#=====
```

The TDES_CHANNEL object that is related to this TDES_CHANNEL object.

```

self.DESChannel_Connected_DES_CHANNEL_class = None

    """
    TDES_Channel_Type_tuple =(
        'TChannel_Input', #=0
        'TChannel_Output' #=1
    )
    """
    Another type of TDES_CHANNEL related to the TDES_CHANNEL object.
    self.DESChannel_Connected_DESObject_ChannelType =\
    TEnumTUPLE(
    TDES_Channel_Type_tuple,
    'TChannel_Output')

    Name the channel TDES_BRANCH associated with the TDES_CHANNEL object.
    self.DESChannel_Connected_DESBranch_Name_str =
    'CONNECTED_DES_BRANCH_NAME'

    The TDES_BRANCH object(class) of the channel associated with the TDES_CHANNEL object.
    self.DESChannel_Connected_DESBranch_class = None

    Name the channel TDES_OBJECT related to the TDES_CHANNEL object.
    self.DESChannel_Connected_DESObject_Name_str =
    'CONNECTED_DES_OBJECT_NAME'

    The channel TDES_OBJECT object(class) associated with the TDES_CHANNEL object.
    self.DESChannel_Connected_DESObject_class = None

    The index value of another channel related to the TDES_CHANNEL object.
    self.DESChannel_Connected_DESObject_Channel_Index = 0

#end of def __init__
#-----
#-----

#end of class TDES_CHANNEL
#-----
#-----
#-----
#-----

```


6.4 TDES_CONNECTION object attributes and methods

In the description, **attributes** appear in red bold, while **methods** appear in blue bold.

The TDES_CONNECTION object has no methods!

The task of the TDES_CONNECTION object is:

The **TDES_CONNECTION** object creates a relationship *between **TDES_CHANNEL** output and input connection objects of DES objects in a DES Python simulation system*. This object allows an output channel object (**TDES_CHANNEL**) in the simulation system to pass the Entity object stored in it to the input channel object (**TDES_CHANNEL**) attached to it.

The **TDES_CONNECTION** object can implement the passing of an Entity.

The owner object of the **TDES_CONNECTION** object is the **TDES_BRANCH**, which means that without the **TDES_BRANCH** this object *cannot function*.

The name of the **TDES_CONNECTION** object **DESConnection_Name_str** or a name that can be given by the user and closely related to the operation of a specific system **DESConnection_Caption_str**.

However, they are used less frequently, since connections are usually referred to in the

- output channel DES branch (**TDES_BRANCH**) naming **OUT**,
- output channel DES object (**TDES_OBJECT**) naming **OUT**,
- output channel DES object index **OUT**,
- naming of input channel DES branch (**TDES_BRANCH**) **IN**,
- input channel DES object (**TDES_OBJECT**) naming **IN**,
- input channel DES object index **IN**

parameters.

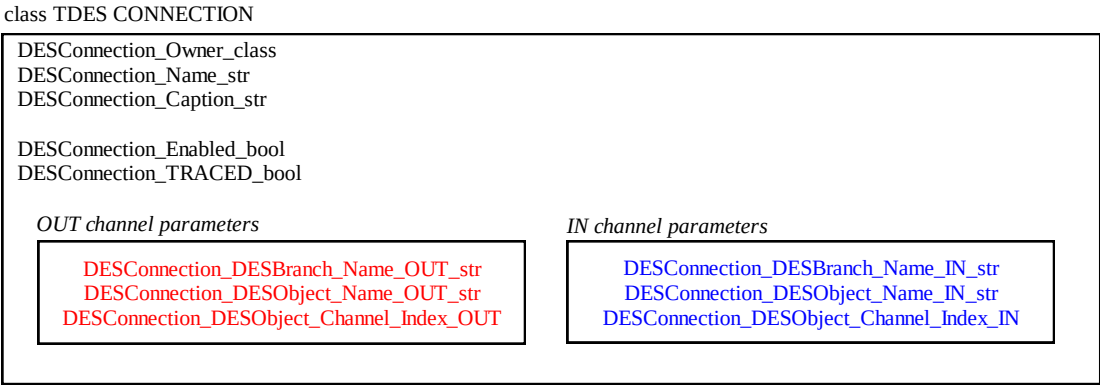


Figure 6.4.117 Block diagram of TDES_CONNECTION object {33}

To define the TDES_CONNECTION object:

To create an object of type **TDES_CONNECTION** in DES Python, do the following:

```
LConnection = TDES_CONNECTION()
```

The **TDES_CONNECTION** object includes pointers pointing to objects with names specified as input parameters (**TDES_BRANCH**, **TDES_OBJECT**, **TDES_CHANNEL**) providing enhancement capabilities.

Attributes of the TDES_CONNECTION object:**List of attributes of TDES_CONNECTION**

```
.class TDES_CONNECTION
    self.DESConnection_Owner_class
    self.DESConnection_Name_str
    self.DESConnection_Caption_str

    self.DESConnection_DESBranch_Name_OUT_str
    self.DESConnection_DESObject_ID_Number_OUT
    self.DESConnection_DESObject_Name_OUT_str
    self.DESConnection_DESObject_Channel_Index_OUT

    self.DESConnection_DESBranch_Name_IN_str
    self.DESConnection_DESObject_ID_Number_IN
    self.DESConnection_DESObject_Name_IN_str
    self.DESConnection_DESObject_Channel_Index_IN

    self.DESConnection_Enabled_bool
    self.DESConnection_TRACED_bool
```

```
.class TDES_CONNECTION
```

The TDES_CONNECTION object implements the relationship between the output and input channels of the TDES_OBJECT.

```
"""
```

```
def __init__(self):
```

The owner object of the TDES_CONNECTION object. A TDES_OBJECT object.

```
self.DESConnection_Owner_class = None
```

Name the TDES_CONNECTION object in the simulation program.

```
self.DESConnection_Name_str = 'NAME_OF_CONNECTION'
```

User naming of the TDES_CONNECTION object in the simulation program.

```
self.DESConnection_Caption_str = 'CAPTION_OF_CONNECTION'
```

Name the exit point TDES_BRANCH object of the TDES_CONNECTION object.

```
self.DESConnection_DESBranch_Name_OUT_str = 'NAME_OF_DES_BRANCH_OUT'
```

```
#FROM
```

The ID_Number value of the TDES_CONNECTION object's exit TDES_OBJECT.

```
self.DESConnection_DESObject_ID_Number_OUT = 0 #FROM
```

Name the exit TDES_OBJECT of the TDES_CONNECTION object.

```
self.DESConnection_DESObject_Name_OUT_str = 'NAME_OF_SENDER_OBJECT_OUT'
#FROM
```

The index value of the exit TDES_CHANNEL of the TDES_CONNECTION object.

Possible index values for output channels = [0..NumberOfOutputChannels-1]

```
self.DESConnection_DESObject_Channel_Index_OUT = 0 #FROM
```

Name the entry point TDES_BRANCH object of the TDES_CONNECTION object.

```
self.DESConnection_DESBranch_Name_IN_str = 'NAME_OF_DES_BRANCH_IN' #TO
```

The ID_Number value of the entry TDES_OBJECT of the TDES_CONNECTION object.

```
self.DESConnection_DESObject_ID_Number_IN = 0 #TO
```

Name of the TDES_OBJECT entry point to the TDES_CONNECTION object.

```
self.DESConnection_DESObject_Name_IN_str =
'NAME_OF_DESTINATION_OBJECT_IN' #TO
```

The index value of the TDES_CHANNEL entry point to the TDES_CONNECTION object.

Possible index values for input channels = [0..NumberOfInputChannels-1]

```
self.DESConnection_DESObject_Channel_Index_IN = -1 #TO
```

The permission state of the TDES_CONNECTION object.

If the attribute is set to **False**, then the Relationship object does not allow the Entity from the connection output channel to the connection input channel. In this case, the Entity remains in the output channel of the connection and cannot proceed further.

```
self.DESConnection_Enabled_bool = True
```

The permission state for tracing the TDES_CONNECTION object.

```
self.DESConnection_TRACED_bool = False
```

```
#end of def __init__
```

```
#-----
```

```
#-----
```

```
#end of class TDES_CONNECTION
```

```
#-----
```

```
#-----
```

```
#-----
```

```
#-----
```

6.5 TDES_ENTITY object attributes and methods

In the description, **attributes** appear in red bold, while **methods** appear in blue bold.

The task of the TDES_ENTITY object is:

The **TDES_ENTITY** object in the DES Python simulation system is a DES object representing model (material) properties, which passes through the **TDES_OBJECT** of the simulation system and implements the operation of the DES system model.

The owner object of the **TDES_ENTITY** object is the **TDES_ENTITYLIST**, which means that without the **TDES_ENTITYLIST** this object cannot functioning.

The **TDES_ENTITYLIST** as a container object that contains the Entities created in the simulation system. From **TDES_ENTITYLIST**, it is possible to retrieve Entities in the simulation model based on Entity name, ID_Number value, or index.

In the simulation model, active entities are defined by

```
ENTITYLIST = TDES_ENTITYLIST('ENTITYLIST')
object.
```

Entities that have left the simulation system (previously active) are represented by clicking

```
SINKED_ENTITYLIST = TDES_ENTITYLIST('SINKED_ENTITYLIST')
object.
```

The **TDES_ENTITY** object has a name (**DESEntity_Name_str**) used by the simulation system to identify Entities, and a name that can be given by the user and closely related to the operation of a specific system (**DESEntity_Caption_str**).

To define the TDES_ENTITY object:

To create an object of type **TDES_ENTITY** in DES Python in the following way:

```
LEntity1 = TDES_ENTITY('Source1', 'Apple')
```

in this case, we will provide the name of the **TDES_OBJECT** containing the Entity and the name of the Entity (**TDES_ENTITY**).

or alternatively, if we cannot or cannot specify them, then the Entity is defined as follows:

```
LEntity2 = TDES_ENTITY()
```

Attributes of the TDES_ENTITY object:**List of attributes of TDES_ENTITY**

```

.class TDES_ENTITY
    self.DESEntity_Owner_class
    self.DESEntity_ID_Number

    self.DESEntity_Name_str
    self.DESEntity_Given_Name_str
    self.DESEntity_Caption_str

    self.DESEntity_Branch_Name_str
    self.DESEntity_Parent_Element_Name_str
    self.DESEntity_Parent_Element_class
    self.DESEntity_Previous_Parent_Element_Name_str
    self.DESEntity_Previous_Parent_Element_class

    self.DESEntity_Type
    self.DESEntity_FullName_str

    self.DESEntity_Deep_Of_Entity_Levels
    self.DESEntity_Capacity
    self.DESEntity_Number_Of_Content_Entities
    self.DESEntity_Content_Entities_Vector

    """
#####
    TDES_ENTITY_HYSTORICAL_SYSTEM_ATTRIBUTE = (
        DESAttribute_Name_str = ''
        DESAttribute_Name_Version_int = 0
        DESAttribute_Value_str = ''
    )
#####
    TDES_ENTITY_SYSTEM_ATTRIBUTE = (
        DESAttribute_Name_str = ''
        DESAttribute_Value_str = ''
        DESAttribute_Value_dbl = 0.0
    )
#####
    TDES_ENTITY_USER_ATTRIBUTE = (
        DESAttribute_Name_str = ''
        DESAttribute_Value_str = ''
    )
    """

    self.DESEntity_Hystorical_System_Attributes_Vector
    self.DESEntity_System_Attributes_dict
    self.DESEntity_User_Attributes_dict

    self.DESEntity_DataTable_RowIndex_
    self.DESEntity_DataTable_ColumnIndex_
    self.DESEntity_DataTable_RowIndex
    self.DESEntity_DataTable_ColumnIndex

    self.DESEntity_DataTable_str

    self.DESEntity_Borning_Time
    self.DESEntity_Terminate_Time
    self.DESEntity_Age

```



```
self.DESEntity_Enter_Time_Into_DESElement
self.DESEntity_Exit_Time_From_DESElement

self.DESEntity_Priority_Value
self.DESEntity_Match_Value_str

self.DESEntity_SELF_MANAGED_bool
self.DESEntity_SELF_MANAGED_OrderList
self.DESEntity_SELF_MANAGED_OrderList_Index
self.DESEntity_SELF_MANAGED_OrderList_Record

self.DESEntity_InputChannel_Index_Of_Arrive
self.DESEntity_OutputChannel_Index_Of_Leave

self.DESEntity_Position_In_Object
self.DESEntity_Position_Calculation_Enabled_bool

self.DESEntity_First_Calculation_bool

self.DESEntity_Geometrical_Position
self.DESEntity_Speed
self.DESEntity_Acceleration

self.DESEntity_Arrive_Time_To_PATH
self.DESEntity_Acceleration_In_PATH
self.DESEntity_Speed_In_PATH
self.DESEntity_Retardation_In_PATH
self.DESEntity_Acceleration_Time_In_PATH
self.DESEntity_Constant_Velocity_Time_In_PATH
self.DESEntity_Retardation_Time_In_PATH
self.DESEntity_Total_Delay_Time_In_PATH
```


The name of the *TDES BRANCH branch* in which the TDES_ENTITY object currently resides.
`self.DESEntity_Branch_Name_str = 'NAME_OF_BRANCH'`

Name the object in which the TDES_ENTITY object is currently located, which can be TDES_OBJECT or TDES_ENTITY.
`self.DESEntity_Parent_Element_Name_str = Parent_DESObject_Name_str`

The *type of object* in which the TDES_ENTITY object is currently located, which can be TDES_OBJECT or TDES_ENTITY.
`self.DESEntity_Parent_Element_class = None # TDES_OBJECT or TDES_ENTITY`

Name *the object* in which the TDES_ENTITY object resided in the previous simulation step, which can be TDES_OBJECT or TDES_ENTITY.
`self.DESEntity_Previous_Parent_Element_Name_str = 'NAME_OF_PREVIOUS_PARENT_OBJECT'`

The *type of object* in which the TDES_ENTITY object resided in the previous simulation step, which can be TDES_OBJECT or TDES_ENTITY.
`self.DESEntity_Previous_Parent_Element_class = None # TDES_OBJECT or TDES_ENTITY`

Type of TDES_ENTITY object.
`self.DESEntity_Type = 'TENTITY' # it's self type`

The full name of *the TDES ENTITY object*.
 The full name is the name of the parent object and the name of the TDES_ENTITY is '.' separated by .
 Example: 'NAME_OF_PARENT_OBJECT.NAME_OF_ENTITY'
`self.DESEntity_FullName_str = 'NAME_OF_PARENT_OBJECT.NAME_OF_ENTITY'`

The depth of nesting of other TDES_ENTITY s in the TDES_ENTITY object.
`self.DESEntity_Deep_Of_Entity_Levels = 0`

The maximum number of other TDES_ENTITY objects that *can be placed in a TDES ENTITY object*.
`self.DESEntity_Capacity = 999999999999 # 9.9e+12`

The count of other TDES_ENTITY currently located in the TDES_ENTITY object.

```
self.DESEntity_Number_Of_Content_Entities = 0
```

A histogram vector of the current count of *TDES ENTITY that can be placed in a TDES ENTITY object*. The attribute specifies the distribution of counts for other Entities placed in the Entity in simulation steps.

```
self.DESEntity_Content_Entities_Vector = [] # Max. number =
DESEntity_Capacity
```

```

"""
#####
#####
TDES_ENTITY_HYSTORICAL_SYSTEM_ATTRIBUTE = (
    DESAttribute_Name_str = ''
    DESAttribute_Name_Version_int = 0
    DESAttribute_Value_str = ''
)

#####
TDES_ENTITY_SYSTEM_ATTRIBUTE = (
    DESAttribute_Name_str = ''
    DESAttribute_Value_str = ''
    DESAttribute_Value_dbl = 0.0
)

#####
TDES_ENTITY_USER_ATTRIBUTE = (
    DESAttribute_Name_str = ''
    DESAttribute_Value_str = ''
)
"""
```

The TDES_ENTITY object is a vector of attributes of a historical system.

```
self.DESEntity_Hystorical_System_Attributes_Vector = [] #
TDES_ENTITY_HYSTORICAL_SYSTEM_ATTRIBUTE
```

The TDES_ENTITY object *system attributes directory* is {dictionary}.

```
self.DESEntity_System_Attributes_dict = {} # TDES_ENTITY_SYSTEM_ATTRIBUTE
```

The directory of user attributes for the TDES_ENTITY object is {dictionary}.

```
self.DESEntity_User_Attributes_dict = {} # TDES_ENTITY_USER_ATTRIBUTE
```

```

self.DESEntity_DataTable_RowIndex_Max = 2 # DataTable_RowIndex_Max
self.DESEntity_DataTable_ColumnIndex_Max = 2 # DataTable_ColumnIndex_Max

self.DESEntity_DataTable_RowIndex = 0
self.DESEntity_DataTable_ColumnIndex = 0
```

The matrix of the string table of the TDES_ENTITY object.

```
self.DESEntity_DataTable_str = []
```

The simulation time at which the TDES_ENTITY object was created.

```
self.DESEntity_Borning_Time = DES_GNot_Existing_Time
```

The simulation time of the cessation of the TDES_ENTITY object.

```
self.DESEntity_Terminate_Time = DES_GNot_Existing_Time
```

The age of the TDES_ENTITY object in simulation units of time.

```
self.DESEntity_Age = DES_GNot_Existing_Time
```

The entry time of the TDES_ENTITY object in simulation time units into another DES object (TDES_OBJECT or TDES_ENTITY).

```
self.DESEntity_Enter_Time_Into_DESElement = DES_GNot_Existing_Time
```

The exit time of the TDES_ENTITY object in simulation time units from another DES object (TDES_OBJECT or TDES_ENTITY).

```
self.DESEntity_Exit_Time_From_DESElement = DES_GNot_Existing_Time
```

The priority value *of the TDES ENTITY object*.

The TBUFFER object is used in one of the Entity selection strategies.

The priority value is an integer with any sign.

Numbers with negative signs and zero(0) have no (any) effect.

For positive numerical values, a higher absolute number means higher priority.

```
self.DESEntity_Priority_Value = 0
```

The lookup value of the TDES_ENTITY object in the TBUFFER object.

The attribute is used to define the next selected Entity of the TBUFFER object in the selection algorithm for the next Entity in the queue.

```
self.DESEntity_Match_Value_str = ''
```

A Boolean variable that specifies whether the TDES_ENTITY object *has self-organizing properties in the SOURCE, BUFFER, and MACHINE TDES OBJECT*.

```
self.DESEntity_SELF_MANAGED_bool = False
```

If the TDES_ENTITY object has a self-organizing property, this action list specifies the records for the action for each action.

```
self.DESEntity_SELF_MANAGED_OrderList = []
```

If the TDES_ENTITY object has a self-organizing property, this is the action list index, which specifies which row in the action list will be the next action.

```
self.DESEntity_SELF_MANAGED_OrderList_Index = 0
```

If the TDES_ENTITY object has a self-organizing property, this specifies a row (record) in the action list, which is a description of an operation.

```
self.DESEntity_SELF_MANAGED_OrderList_Record = () # tuple
```

The input channel index value through which the TDES_ENTITY object entered the TDES_OBJECT performing the operation.

```
self.DESEntity_InputChannel_Index_Of_Arrive = 0
```

The output channel index value through which the TDES_ENTITY object exited the TDES_OBJECT performing operations.

```
self.DESEntity_OutputChannel_Index_Of_Leave = 0
```

```
# Entity Position (Input_Channel)(In_Object)(Output_Channel)
"""
```

```
TDES_Entity_Position_In_DESObject=(
    'TAt_Input_Channel',      #=0
    'TIn_Object',            #=1
    'TAt_Output_Channel'     #=2
)
"""
```

Location of the TDES_ENTITY object in the operation TDES_OBJECT.

```
self.DESEntity_Position_In_Object =\
    TEnumTuple(
        TDES_Entity_Position_In_DESObject_tuple,
        'TAt_Input_Channel'
    )
```

```
#####
#####
# Geometrical parameters
```

A Boolean variable that allows the position calculation of the TDES_ENTITY object.

```
self.DESEntity_Position_Calculation_Enabled_bool = False
```

The first application (*calculation*) of the TDES_ENTITY object.

```
self.DESEntity_First_Calculation_bool = True
```

The position of *the TDES ENTITY object*.

TDESEntity_Position() is the data type defined in TDES_TYPES.py.

```
self.DESEntity_Geometrical_Position = TDESEntity_Position() # [m]
```

The speed of *the TDES ENTITY object*.

TDESEntity_Speed() is the data type defined in TDES_TYPES.py.

```
self.DESEntity_Speed = TDESEntity_Speed() # [m/s]
```

Acceleration of *the TDES ENTITY object*.

TDESEntity_Acceleration() is the data type defined in TDES_TYPES.py.

```
self.DESEntity_Acceleration = TDESEntity_Acceleration() # [m/s^2]
```

The simulation arrival time of the TDES_ENTITY object for the route segment.
 self.DESEntity_Arrive_Time_To_PATH = 0.0 # [sec]

The acceleration value of the TDES_ENTITY object in the path segment.
 self.DESEntity_Acceleration_In_PATH = 1.0 # [m/s^2]

The speed value of the TDES_ENTITY object in the path segment.
 self.DESEntity_Speed_In_PATH = 1.0 # [m/s]

The deceleration value of the TDES_ENTITY object in the path segment.
 self.DESEntity_Retardation_In_PATH = -1.0 # [m/s^2]

Durations on the TPATH object

The acceleration duration value of the TDES_ENTITY object.
 self.DESEntity_Acceleration_Time_In_PATH = 0.0 # [s] # By program
 calculated variable

The duration value of the TDES_ENTITY object at constant speed.
 self.DESEntity_Constant_Velocity_Time_In_PATH = 0.0
 # [s] # By program calculated variable

The deceleration duration value of the TDES_ENTITY object.
 self.DESEntity_Retardation_Time_In_PATH = 0.0 # [s] # By program
 calculated variable

The duration value of the total delay of the TDES_ENTITY object in the path segment.
 self.DESEntity_Total_Delay_Time_In_PATH = 0.0 # [s] # By program
 calculated variable

#####

#end of def __init__

#-----
 #-----
 #-----
 #-----

Methods for TDES_ENTITY object:**List of methods of TDES_ENTITY**

```

def DESEntity_Set_Hystorical_System_Attribute
def DESEntity_Set_System_Attribute
def DESEntity_Set_User_Attribute

def DESEntity_Delete_Hystorical_System_Attribute
def DESEntity_Delete_System_Attribute
def DESEntity_Delete_User_Attribute

def DESEntity_Get_Hystorical_System_Attribute
def DESEntity_Get_System_Attribute
def DESEntity_Get_User_Attribute

def DESEntity_Calculate_Of_State
def DESEntity_Position_In_DESObject_str
def DESEntity_Print_DES_ENTITY
def DESEntity_Set_WORKED_Entity_Arrive_Time_Attribute

```

```

def DESEntity_Set_Hystorical_System_Attribute(
    self
    Name_Of_Attribute_str,
    Value_Of_Attribute_str,

    # Python Output:
    #return None
    ):
    """

```

This procedure allows you to create a historical (remembering) system attribute of the TDES_ENTITY object.

"""

```

#.....
# Python program elements
#.....

```

#end of def DESEntity_Set_Hystorical_System_Attribute

#-----

```

#####
#####

```

```

def DESEntity_Set_System_Attribute(
    self
    Name_Of_Attribute_str,
    Value_Of_Attribute_dbl,
    Value_Of_Attribute_str,

    # Python Output:
    #return None
    ):
    """

```

This procedure allows you to create a system attribute of the TDES_ENTITY object.

"""

#.....

Python program elements

#.....

#end of def DESEntity_Set_System_Attribute

#-----

#####

```
def DESEntity_Set_User_Attribute(
    self
    Name_Of_Attribute_str,
    Value_Of_Attribute_str,
```

Python Output:

#return None

):

"""

This procedure allows you to create a user attribute for the TDES_ENTITY object.

"""

#.....

Python program elements

#.....

#end of def DESEntity_Set_User_Attribute

#-----

#####

```
def DESEntity_Delete_Hystorical_System_Attribute(
    self
    Name_Of_Attribute_str = '',
```

Python Output:

#return [self.Deleted_entity_hys_sys_attr,

#TDES_ENTITY_HYSTORICAL_SYSTEM_ATTRIBUTE

self.Erasing_Is_OK_bool]

):

"""

This procedure allows you to delete the historical (remembering) system attribute of the TDES_ENTITY object.

When you delete an attribute, all attributes with Name_Of_Attribute_str parameters are deleted.

"""

#.....

Python program elements

#.....

#end of def DESEntity_Erase_Hystorical_System_Attribute

#-----

```
#####
#####
def DESEntity_Delete_System_Attribute(
    self
    Name_Of_Attribute_str,

    # Python Output:
    # return [self.Deleted_entity_sys_attr, #TDES_ENTITY_SYSTEM_ATTRIBUTE
    # self.Erasing_Is_OK_bool,
    # Information_Message_str]
    ):
    """
```

This procedure allows you to delete the system attribute of the TDES_ENTITY object.

```
#####
    """

#.....
# Python program elements
#.....

#end of def DESEntity_Erase_System_Attribute
#-----
```

```
#####
#####
def DESEntity_Delete_User_Attribute(
    self
    Name_Of_Attribute_str,

    # Python Output:
    # return [self.Deleted_entity_user_attr, #TDES_ENTITY_USER_ATTRIBUTE
    # self.Erasing_Is_OK_bool,
    # Information_Message_str]
    ):
    """
```

This procedure allows you to delete the user attribute of the TDES_ENTITY object.

```
#####
    """

#.....
# Python program elements
#.....

#end of def DESEntity_Erase_User_Attribute
#-----
```

```
#####
#####
def DESEntity_Get_Hystorical_System_Attribute(
    self
    Name_Of_Attribute_str = ''

    # Python Output:
    # return [self.entity_hys_sys_attr,
#TDES_ENTITY_HYSTORICAL_SYSTEM_ATTRIBUTE
    # self.Getting_Is_OK_bool,
```

```

        # Information_Message_str]
    ):
    """
    This procedure allows you to read out the historical (remembering) system attribute of
    the TDES_ENTITY object. Returns the last attribute value (with the highest index
    value).
    """

    #.....
    # Python program elements
    #.....

#end of def DESEntity_Get_Hystorical_System_Attribute
#-----

#####
#####
def DESEntity_Get_System_Attribute(
    self
    Name_Of_Attribute_str = ''

    # Python Output:
    # return [self.entity_sys_attr, #TDES_ENTITY_SYSTEM_ATTRIBUTE
    # self.Getting_Is_OK_bool,
    # Information_Message_str]
    ):
    """
    This procedure allows you to read the system attribute of the TDES_ENTITY object.
    """

    #.....
    # Python program elements
    #.....

#end of def DESEntity_Get_System_Attribute
#-----

#####
#####
def DESEntity_Get_User_Attribute(
    self
    Name_Of_Attribute_str = ''

    # Python Output:
    # return [self.entity_user_attr, #TDES_ENTITY_USER_ATTRIBUTE
    # self.Getting_Is_OK_bool,
    # Information_Message_str]
    ):
    """
    This procedure retrieves the user attribute of the TDES_ENTITY object.
    """

    #.....
    # Python program elements
    #.....

#end of def DESEntity_Get_User_Attribute
#-----

```

```
#####
#####
def DESEntity_Calculate_Of_State(
    self

    # Python Output:
    # return None
    ):
    """
    This procedure allows you to update the state of the TDES_ENTITY object.
    """
    #Instructions are not defined yet to this object! {DES_ENTITY}
    Pass

#.....
# Python program elements
#.....

#end of def DESEntity_Calculate_Of_State
#-----

#####
#####
def DESEntity_Position_In_DESObject_str(
    self

    # Python Output:
    # return Entity_Position_str
    ):
    """
    This procedure converts the position of the TDES_ENTITY object in TDES_OBJECT to a
    string variable.
    """

#.....
# Python program elements
#.....

#end of def DESEntity_Position_In_DESObject_str
#-----
```

```
#####
#####
def DEEntity_Print_DES_ENTITY(
    self

    # Python Output:
    # return [self.Memo_str]
    ):
    """
    The procedure writes all properties (attributes) of the TDES_ENTITY object to a string
    variable.
    """

    #.....
    # Python program elements
    #.....

#end of def DEEntity_Print_DES_ENTITY
#-----

#####
#####
def DEEntity_Set_WORKED_Entity_Arrive_Time_Attribute(
    self
    Time_Now,

    # Python Variables:
    # return None
    ):
    """
    This procedure records the times when the TDES_ENTITY object enters and exits the DES
    object in the Entity system attributes.
    """

    #.....
    # Python program elements
    #.....

#end of def DEEntity_Set_WORKED_Entity_Arrive_Time_Attribute
#-----

#end of TDES_ENTITY
#-----
#-----
#-----
#-----
```

6.6 TDES_ENTITYLIST object attributes and methods

In the description, **attributes** appear in red bold, while **methods** appear in blue bold.

The task of the TDES_ENTITYLIST object is:

The **TDES_ENTITYLIST** object provides storage of **TDES_ENTITY** objects in the DES Python simulation system.

The owner object of the **TDES_ENTITYLIST** object is None, that is, this object no longer has an owner object.

From **TDES_ENTITYLIST**, it is possible to retrieve Entities in the simulation model based on Entity name, ID_Number value, or index.

In the simulation model, active entities are defined by

```
ENTITYLIST = TDES_ENTITYLIST('ENTITYLIST')
```

object.

Entities that have already left the simulation system (previously active) are represented by

```
SINKED_ENTITYLIST = TDES_ENTITYLIST('SINKED_ENTITYLIST')
```

object.

The **TDES_ENTITYLIST** object has a name (**DESEntityList_Name_str**) used by the simulation system to identify **TDES_ENTITYLIST** and a user-defined name (**DESEntityList_Caption_str**).

To define the TDES_ENTITYLIST object:

To create an object of type TDES_ENTITYLIST in DES Python in the following way:

```
LEntityList = TDES_ENTITYLIST('ENTITYLIST')
```

Attributes of the TDES_ENTITYLIST object:**List of attributes of TDES_ENTITYLIST**

```
.class TDES_ENTITYLIST
    self.DESEntityList_Owner_class
    self.DESEntityList_List
    self.DESEntityList_Name_str
    self.DESEntityList_Caption_str
    self.DESEntityList_Maximum_Length_of_DESEntity_Name

#####
#####
#####
#####
.class TDES_ENTITYLIST:
    """
    """

#####
#####
    def __init__(
        self
        EntityList_Name_str,
    ):

The owner object of the TDES_ENTITYLIST object.
    self.DESEntityList_Owner_class = None # Input variable

The TDES_ENTITYLIST object is TDES_ENTITY container vector.
    self.DESEntityList_List = [] # Input variable

Name the TDES_ENTITYLIST object in the simulation program
    self.DESEntityList_Name_str =EntityList_Name_str# Input variable

User name of the TDES_ENTITYLIST object in the simulation program
The program does not use it, only information!
    self.DESEntityList_Caption_str = 'CAPTION_OF_ENTITYLIST' # Input variable

The maximum length of names for TDES_ENTITY objects stored in TDES_ENTITYLIST objects.
    self.DESEntityList_Maximum_Length_of_DESEntity_Name = 0 # By program
    calculated variable
```



```
# end of def __init__
```

```
#-----
```

Methods of the TDES_ENTITYLIST object are:**List of methods of TDES_ENTITYLIST**

```

def DESEntityList_Insert_Entity_Into_EntityList
def DESEntityList_Delete_Entity_From_EntityList
def DESEntityList_Entity_Name_To_Index
def DESEntityList_Entity_ID_Number_To_Index

def DESEntityList_Entity_By_Name
def DESEntityList_Entity_By_Index
def DESEntityList_Entity_By_ID_Number

def DESEntityList_Print_Entity_Short
def DESEntityList_Print_EntityList_Short
def DESEntityList_Print_EntityList

def DESEntityList_Insert_ID_Number_Into_Entity_ContentVector

#####
#####
def DESEntityList_Insert_Entity_Into_EntityList(
    self
    Entity = TDES_ENTITY,

    # Python Output:
    # return [self.Entity_Insert_Is_OK_bool,
    # Information_Message_str]
    ):
    """
This procedure appends an Entity to the TDES_ENTITYLIST object (at the end of the
list).
    """

#.....
# Python program elements
#.....

# end of def DESEntityList_Insert_Entity_Into_EntityList
#-----

#####
#####
def DESEntityList_Delete_Entity_From_EntityList(
    self
    ID_Number_Of_Entity, #in EntityList.DESEntityList_List

    # Python Output:
    # return [self.Deleted_Entity, #TDES_ENTITY
    # self.Entity_Delete_Is_OK_bool,
    # Information_Message_str]
    ):
    """

```

This procedure deletes an Entity from the TDES_ENTITYLIST object.
The Entity is selected using the ID_Number_Of_Entity parameter.

```

"""
#.....
# Python program elements
#.....

# end of def DESEntityList_Delete_Entity_From_EntityList
#-----

```

```

#####
#####

```

```

def DESEntityList_Entity_Name_To_Index(
    self
    Entity_Name_str, #in self.DESEntityList_List

    # Python Output:
    # return [self.Entity,
    # self.Entity_Index, #TDES_ENTITY
    # self.Entity_Index_Is_OK_bool,
    # Information_Message_str]
    ):
    """

```

The procedure determines its index in the list based on the name of an entity in the TDES_ENTITYLIST object.

```

"""
#.....
# Python program elements
#.....

# end of def DESEntityList_Entity_Name_To_Index
#-----

```

```

#####
#####

```

```

def DESEntityList_Entity_ID_Number_To_Name(
    self
    ID_Number_Of_Entity, #in EntityList.DESEntityList_List

    # Python Output:
    # return [self.Entity, #TDES_ENTITY
    # self.Entity_Name_str,
    # self.Entity_Index,
    # self.Entity_Name_Is_OK_bool,
    # Information_Message_str]
    ):
    """

```

The procedure determines the name of the Entity in the TDES_ENTITYLIST object based on the ID_Number_Of_Entity parameter of the Entity.

```

"""
#.....
# Python program elements
#.....

# end of def DESEntityList_Entity_ID_Number_To_Name
#-----

```

```
#####
#####
def DESEntityList_Entity_ID_Number_To_Index(
    self
    ID_Number_Of_Entity, #in EntityList.DESEntityList_List

    # Python Output:
    # return [self.Entity, #TDES_ENTITY
    # self.Entity_Index,
    # self.Entity_Index_Is_OK_bool,
    # Information_Message_str]
    ):
    """
```

The procedure determines the list index in the TDES_ENTITYLIST object based on an Entity's ID_Number_Of_Entity parameter.

```
    """

#.....
# Python program elements
#.....

# end of def DESEntityList_Entity_ID_Number_To_Index
#-----
```

```
#####
#####
def DESEntityList_Entity_By_Name(
    self
    Entity_Name_str, #in EntityList.DESEntityList_List

    # Python Output:
    # return [self.Entity, #TDES_ENTITY
    # self.Entity_Index,
    # self.Entity_Name_Is_OK_bool,
    # Information_Message_str]
    ):
    """
```

The procedure reads the Entity based on the name of an Entity in the TDES_ENTITYLIST object and specifies its index in the list.

```
    """

#.....
# Python program elements
#.....

# end of def DESEntityList_Entity_By_Name
#-----
```

```
#####
#####
def DESEntityList_Entity_By_Index(
    self
    Entity_Index, #in EntityList.DESEntityList_List
```

```

# Python Output:
# return [self.Entity, #TDES_ENTITY
# self.Entity_Index_Is_OK_bool,
# Information_Message_str]
#):
"""
The procedure reads the Entity object from the index of an entity in the
TDES_ENTITYLIST object.
"""

#.....
# Python program elements
#.....

# end of def DESEntityList_Entity_By_Index
#-----

#####
#####
def DESEntityList_Entity_By_ID_Number(
    self
    Entity_ID_Number, #in self.DESEntityList_List

    # Python Output:
    # return [self.Entity, #TDES_ENTITY
    # self.Entity_Index,
    # self.Entity_ID_Number_Is_OK_bool,
    # Information_Message_str]
    #):
    """
    The procedure reads the Entity object and the Entity index based on the
    ID_Number_Of_Entity value of an Entity in the TDES_ENTITYLIST object.
    """

    #.....
    # Python program elements
    #.....

    # end of def DESEntityList_Entity_By_ID_Number
    #-----

#####
#####
def DESEntityList_Print_Entity_Short(
    self
    DESBranch_Name_str,
    DESEntity_ID_Number,

    # Python Output:
    # return [Memo_str]
    #):
    """
    This procedure lists the most important parameters for the Entity in the
    TDES_ENTITYLIST object (name, DES Object in which the Entity is located, Entity
    position in DES Object).
    The Entity is selected with the DESBranch_Name_str and DESEntity_ID_Number parameters.
    """

```

```

#.....
# Python program elements
#.....

#end of def DESEntityList_Print_Entity_Short
#-----

#####
#####
def DESEntityList_Print_EntityList_Short(
    self
    DESBranch_Name_str,
    Time_Now

    # Python Output:
    # return [Memo_str,
    # Memo_tab_separated_str]
    ):
    """
    This procedure lists the most important parallels of the Entities in the
    TDES_ENTITYLIST object (name, DES object in which the Entity is located, Entity
    position in DES object).
    """

#.....
# Python program elements
#.....

#end of def DESEntityList_Print_EntityList_Short
#-----

#####
#####
def DESEntityList_Print_EntityList(
    self
    DESBranch_Name_str,
    Time_Now,

    # Python Output:
    # return [Memo_str]
    ):
    """
    This procedure lists all parameters for Entities in the TDES_ENTITYLIST object.
    """

#.....
# Python program elements
#.....

#end of def Print_EntityList
#-----

#####
#####
def DESEntityList_Insert_ID_Number_Into_Entity_ContentVector(

```

```

        self
        Container_Entity_ID_Number =0, #of ID_Number of Container Entity
        Entity_ID_Number_to_insert =0, #ID_Number of Entity to insert

# Python Output:
    # return [self.Entity_Insert_Is_OK_bool]
    ):
    """
The procedure places the ID_Number value of another entity in one TDES_ENTITY object
(the Entity_ContentVectorban).
    """

#.....
# Python program elements
#.....

#end of def DESEntityList_Insert_ID_Number_Into_Entity_ContentVector
#-----

# End of Class DES_ENTITYLIST
#-----
#-----
#-----
#-----

```

DES Python global variables:

```

ENTITYLIST = TDES_ENTITYLIST('ENTITYLIST')

SINKED_ENTITYLIST = TDES_ENTITYLIST('SINKED_ENTITYLIST')

```

6.7 TDES_OBJECT object attributes and methods

In the description, **attributes** appear in red bold, while **methods** appear in blue bold.

The task of the TDES_OBJECT object is:

The **TDES_OBJECT** object in the DES Python simulation system is the discrete event action object. It performs operations with TDES_ENTITY objects, which can be:

- Create entity, (**TSOURCE**)
- Entity staging (**TBUFFER**)
- Delay entity progression, (**TMACHINE**)
- Wrap an entity in another Entity (**TWRAPPER**)
- Unwrapping an entity from another Entity (**TUNWRAPPER**)
- Entity Termination, (**TSINK**)
- Entity traverses a multi-lane path (staging + delay) (**TPATH**)

Restrict an entity from entering a specific part of the model. (**TLOCK, TUNLOCK**)

The owner object of the **TDES_OBJECT** object is the **TDES_BRANCH**, which means that without the **TDES_BRANCH** this object cannot functioning.

The **TDES_OBJECT** object is called **self.DESObject_Name_str** used by the simulation system to identify **TDES_OBJECT** and the name self, which can be given by the user and closely related to the operation of a specific system. **DESObject_Caption_str**.

To define the TDES_OBJECT object:

To create an object of type **TDES_OBJECT** in DES Python in the following way:

```
LBuffer1 = TDES_OBJECT(  
    TBUFFER,          # Type of DES object  
    'Buffer1',        # Name the DES object  
    6,                # Number of input channels  
    6                  # Number of output channels  
)
```

where:

LBuffer1 The **TDES_OBJECT** object

Attributes of the TDES_OBJECT object:**List of attributes of TDES_OBJECT**

```

.class TDES_OBJECT
    self.Memo_CSS_str

    self.DESObject_Owner_class
    self.DESObject_Name_str
    self.DESObject_Caption_str
    self.DESObject_ID_Number
    self.DESObject_ParentName_str
    self.DESObject_Type

    self.DESObject_Number_Of_InputChannels
    self.DESObject_Actual_Number_Of_InputChannels
    self.DESObject_Actual_InputChannel_Indexes_list

    self.DESObject_Number_Of_OutputChannels
    self.DESObject_Actual_Number_Of_OutputChannels
    self.DESObject_Actual_OutputChannel_Indexes_list

    self.DESObject_System_Attributes_dict
    self.DESObject_User_Attributes_dict

    self.DESObject_DataTable_Row_Max
    self.DESObject_DataTable_Column_Max
    self.DESObject_DataTable_RowIndex
    self.DESObject_DataTable_ColumnIndex
    self.DESObject_DataTable_str

    self.DESObject_Priority_To_DESEntity_From_DESObject

    self.DESObject_Commanded_State_In_Previous_Step
    self.DESObject_Commanded_State
    self.DESObject_Work_State
    self.DESObject_Work_State_In_Previous_Step
    self.DESObject_Work_State_Before_Fail_Or_Pause
    self.DESObject_Detailed_State_str
    self.DESObject_Detailed_State_In_Previous_Step_str
    self.DESObject_Detailed_State_Before_Fail_Or_Pause_str
    self.DESObject_Time_In_States

    self.DESObject_Capacity
    self.DESObject_Number_Of_Content_Entities
    self.DESObject_Content_Entities_Vector
    self.DESObject_Borning_Time
    self.DESObject_Terminate_Time
    self.DESObject_Previous_GTime_Now
    self.DESObject_First_Calculation_bool

    self.WORKED_Entity_Arrive_Time
    self.WORKED_Entity_Terminate_Time
    self.WORKED_Entity_Cycle_Time
    self.WORKED_Entity_Sample_Number
    self.WORKED_Entity_Sample_Summa
    self.WORKED_Entity_Average_Staying_Time
    self.WORKED_Entity_Staying_Time_list
    self.WORKED_Entity_Maximal_Number_in_Queue

```

```

self.WORKED_Entity_Queue_Sample_Number
self.WORKED_Entity_Number_in_Queue
self.WORKED_Entity_Number_in_Queue_Summa
self.WORKED_Entity_Average_Number_in_Queue
self.WORKED_Entity_Numbers_in_Queue_list

self.DESObject_Inputs
self.DESObject_InputChannel_Index
self.DESObject_InputChannel_Index_In_PreviousStep
self.DESObject_Setted_InputChannel_Index
self.DESObject_InputChannel_Index_Selection_Strategy
self.DESObject_Number_Of_Input_Entities

self.DESObject_Outputs
self.DESObject_OutputChannel_Index
self.DESObject_OutputChannel_Index_In_PreviousStep
self.DESObject_Setted_OutputChannel_Index
self.DESObject_OutputChannel_Index_Selection_Strategy
self.DESObject_Number_Of_Output_Entities

self.DESObject_Geometrical_Position
self.DESObject_Geometrical_Speed
self.DESObject_Geometrical_Acceleration

#####
# TSOURCE
#####
self.SOURCE_Created_Entity
self.SOURCE_First_Time_of_Entity_Creation

self.SOURCE_Maximum_Batch_Size
self.SOURCE_Number_Of_Created_Entities
self.SOURCE_Time_Of_Next_Launching
self.SOURCE_Time_Step

self.SOURCE_Distribution
self.SOURCE_Constant_Value_Of_Time
self.SOURCE_Mean_Of_Time
self.SOURCE_Deviation_Of_Time
self.SOURCE_Maximum_Of_Time
self.SOURCE_Usual_Of_Time
self.SOURCE_Minimum_Of_Time

self.SOURCE_Is_Continuous_Time_Step_Generator_bool
self.SOURCE_Continuous_Number_of_Time_Steps
self.SOURCE_Continuous_Print_Out_Number
self.SOURCE_Continuous_Time_Step
self.SOURCE_Continuous_Delay_Between_Time_Steps_sec

self.SOURCE_Last_Calculation_Time

```

```
#####
# TBUFFER
#####
    self.BUFFER_Type_Of_Queue
    self.BUFFER_Maximum_Content
    self.BUFFER_Match_Value_str

    self.BUFFER_Last_Calculation_Time

#####
# TPATH
#####
#     self.PATH_Type_Of_Queue

    self.PATH_Number_of_Tracks
    self.PATH_Used_Tracks
    self.PATH_Use_Only_Total_Delay_Time
    self.PATH_Need_Parameter_Recalculation

    self.PATH_Start_Position
    self.PATH_End_Position

    self.PATH_Length
    self.PATH_Acceleration
    self.PATH_Constant_Velocity
    self.PATH_Maximal_Velocity_at_Acceleration
    self.PATH_Maximal_Velocity_at_Retardation
    self.PATH_Retardation
    self.PATH_Acceleration_Time
    self.PATH_Constant_Velocity_Time
    self.PATH_Retardation_Time
    self.PATH_Total_Delay_Time
    self.PATH_Acceleration_Distance
    self.PATH_Constant_Velocity_Distance
    self.PATH_Retardation_Distance
    self.PATH_Total_Distance
    self.PATH_MACHINE_DESObjects

    self.PATH_Last_Calculation_Time

#####
# TMACHINE
#####
    self.MACHINE_Time_Of_Next_Launching
    self.MACHINE_Time_Step

    self.MACHINE_Distribution
    self.MACHINE_Constant_Value_Of_Time
    self.MACHINE_Mean_Of_Time
    self.MACHINE_Deviation_Of_Time
    self.MACHINE_Maximum_Of_Time
    self.MACHINE_Usual_Of_Time
    self.MACHINE_Minimum_Of_Time
    self.MACHINE_Utilization

    self.MACHINE_Last_Calculation_Time
```

```
#####
# TLOCK
#####
    self.LOCK_Time_Of_Next_Launching
    self.LOCK_Time_Step

    self.LOCK_Distribution
    self.LOCK_Entity_Number_Limit_in_Segment
    self.LOCK_Maximum_Number_of_Entities_in_Segment
    self.LOCK_Actual_Number_of_Entities_in_Segment
    self.LOCK_Utilization

    self.LOCK_Last_Calculation_Time

#####
# TUNLOCK
#####
    self.UNLOCK_Time_Of_Next_Launching
    self.UNLOCK_Time_Step

    self.UNLOCK_Distribution
    self.UNLOCK_Utilization

    self.UNLOCK_Last_Calculation_Time

#####
# TSINK
#####
    self.SINK_Last_Content_Entity_ID_Number
    self.SINK_Number_Of_Sinked_Entities
    self.SINK_Store_Entities_Into_Sinked_EntityList_bool
    self.SINK_Detailed_Sinked_EntityList_bool

    self.SINK_Last_Calculation_Time

#####
# TWRAPPER
#####
    self.WRAPPER_Step_Sequence

    self.WRAPPER_Type_Of_Queue

    self.WRAPPER_Entity_Request_At_Channel
    self.WRAPPER_Entity_Amount_At_Channel
    self.WRAPPER_New_Name_of_Package_str
    self.WRAPPER_Forced_Finish_Of_Collecting_Entities_bool
    self.WRAPPER_Delete_Assembled_Entities_bool

    self.WRAPPER_Last_Calculation_Time
```

```
#####  
# TUNWRAPPER  
#####  
    self.UNWRAPPER_Step_Sequence  
  
    self.UNWRAPPER_Type_Of_Queue  
  
    self.UNWRAPPER_Entity_Amount_At_Channel  
    self.UNWRAPPER_OutputIndex  
  
    self.UNWRAPPER_Last_Calculation_Time
```

```
#####
#####
#####
#####
```

```
.class TDES_OBJECT:
    """
    """
```

```
#####
#####
```

```
def __init__(
    self
    Type_Of_Object = 'TBUFFER',
    Name_Of_Object_str = 'Buffer1',
    Number_Of_InputChannels = 1,
    Number_Of_OutputChannels = 1
):
```

Through this variable, we pass the calculation result of CSS Graphics.

```
self.Memo_CSS_str = '' # DESObject_ON_PROCESS_CALL # By program calculated
variable
```

The owner object of the TDES_OBJECT object.

The TDES_OBJECT owner object is a TDES_BRANCH object.

```
#### DESObject_Owner_class
self.DESObject_Owner_class = None # Input variable
```

TDES_OBJECT is called in the simulation program.

```
self.DESObject_Name_str = Name_Of_Object_str # Input variable
```

The user *name of the TDES OBJECT* in the simulation program.

More detailed, more profession-specific name. The simulation program does not use it!

```
self.DESObject_Caption_str = 'CAPTION_OF_DES_OBJECT' # Input variable
```

The value of the TDES OBJECT ID Number.

```
self.DESObject_ID_Number = DES_GID_Number.Value # By program calculated
variable
```

Name the owner (parent) object of the TDES_OBJECT.

```
self.DESObject_ParentName_str = 'NAME_OF_PARENT_OBJECT' # By program
calculated variable
```

```
"""
TDES_Type_Of_DESObject =(
    'EMPTY',      #=0
    'TENTITY',    #=1
    'TSOURCE',    #=2
    'TBUFFER',    #=3
    'TMACHINE',   #=4
    'TSINK',      #=5
    'TWRAPPER',   #=6
    'TUNWRAPPER', #=7
    'TPATH',      #=8
    'TLOCK',      #=9
    'TUNLOCK',    #=10
)
"""
```

Type of TDES_OBJECT

```
self.DESObject_Type =\
    TEnumTuple(
        TDES_Type_Of_DESObject_tuple,
        Type_Of_Object
    ) #Input variable
```

Number of input channels for TDES_OBJECT

```
self.DESObject_Number_Of_InputChannels =Number_Of_InputChannels# Input
variable
```

Number of input channels for TDES_OBJECT employees (currently used)

```
self.DESObject_Actual_Number_Of_InputChannels = 0 # By program calculated
variable
```

Indices of TDES_OBJECT applied (currently used) input channels

```
self.DESObject_Actual_InputChannel_Indexes_list = [] # By program calculated
variable
```

Number of output channels of TDES_OBJECT

```
self.DESObject_Number_Of_OutputChannels = Number_Of_OutputChannels #
Input variable
```


Number of outbound channels for TDES_OBJECT employees (currently used)

```
self.DESObject_Actual_Number_Of_OutputChannels = 0 # By program
calculated variable
```

Indices of TDES_OBJECT applied (currently used) output channels

```
self.DESObject_Actual_OutputChannel_Indexes_list = [] # By program
calculated variable
```

```
"""
#####
# Used by the class of TDES_OBJECT
Class TDES_OBJECT_SYSTEM_ATTRIBUTE:
    def __init__(self):
        DESAttribute_Name_str = ''
        DESAttribute_Value_str = ''
```

```
#####
# Used by the class of TDES_OBJECT
Class TDES_OBJECT_USER_ATTRIBUTE:
    def __init__(self):
        DESAttribute_Name_str = ''
        DESAttribute_Value_str = ''
"""
```


System attributes of DES_OBJECT # dictionary of TDES_OBJECT_SYSTEM_ATTRIBUTE

```
self.DESObject_System_Attributes_dict = {} # Input variable
```

User attributes of DES_OBJECT # dictionary of TDES_OBJECT_USER_ATTRIBUTE

```
self.DESObject_User_Attributes_dict = {} #
Input variable
```

```
#####
self.DESObject_DataTable_Row_Max = 2
#
self.DESObject_DataTable_Column_Max = 2
# Input variable
```

```
self.DESObject_DataTable_RowIndex = 0 #
Input variable
self.DESObject_DataTable_ColumnIndex = 0 #
Input variable
```

Matrix of DES_OBJECT data table

```
self.DESObject_DataTable_str = []

for i in range(self.DESObject_DataTable_Row_Max):
    for j in range(self.DESObject_DataTable_Column_Max):
        self.DESObject_DataTable_str.append('Empty') # Input variable
```


The TDES_OBJECT gives this priority value to the TDES_ENTITY that passes through it. The priority value is the attribute of the object (DES object) that is passed to all entities that enter the object, IF THE PRIORITY VALUE IS POSITIVE.

If the object's priority value is 0 or a negative number, no value is assigned and the Entity priority value is not changed.

```
self.DESObject_Priority_To_DESEntity_From_DESObject = 0 #Input variable
```

```
"""
TDES_Commanded_State =(
    'TCommanded_Enabled_State', #=0
    'TCommanded_Failed_State', #=1
    'TCommanded_Paused_State' #=2
)
"""
```

The commanded state of the TDES_OBJECT, which allows you to set the current state of the object with a parameter.

The commanded state of the TDES_OBJECT is in the previous step.

```
self.DESObject_Commanded_State_In_Previous_Step =\
    TEnumTuple(
        TDES_Commanded_State_tuple,
        'TCommanded_Enabled_State'
    ) # By program calculated variable
```

The status of the TDES_OBJECT commanded is currently.

```
self.DESObject_Commanded_State =\
    TEnumTuple(
        TDES_Commanded_State_tuple,
        'TCommanded_Enabled_State'
    ) # Input variable
```

This is the working state of the object, which represents states at runtime.

```
"""
TDES_Work_State =(
    'TIdle', #=0 Object waiting, working but has no task.
    'TBusy', #=1 The object is working on the ENTITY object it contains.
    'TBlocked', #=2 The object has completed its own task, but cannot add another task.
    'TFailed', #=3 The object cannot work because it has failed.
    'TPaused' #=4 The object is workable, but does not perform work and waits to
replace the failed object.
)
"""
```

The status of the TDES_OBJECT current work.

```
self.DESObject_Work_State =\
    TEnumTuple(
        TDES_Work_State_tuple,
        'TIdle'
    ) # By program calculated variable
```

The status of the TDES_OBJECT work in the previous simulation step.

```
self.DESObject_Work_State_In_Previous_Step =\
    TEnumTuple(
        TDES_Work_State_tuple,
        'TIdle'
    ) # By program calculated variable
```

The status of the TDES_OBJECT job before the "Fail" or "Pause" status.

```
self.DESObject_Work_State_Before_Fail_Or_Pause =\
    TEnumTuple(
        TDES_Work_State_tuple,
        'TIdle'
```

```
) # By program calculated variable
```

The current detailed state of the TDES_OBJECT.

```
self.DESObject_Detailed_State_str = 'Still Not Used'
```

The state of the TDES_OBJECT described in detail in the previous simulation step.

```
self.DESObject_Detailed_State_In_Previous_Step_str = 'Still Not Used'
```

The detailed status of the TDES_OBJECT before the "Fail" or "Pause" status.

```
self.DESObject_Detailed_State_Before_Fail_Or_Pause_str = 'Still Not Used'
```

```
"""
TDES_Status_Time_Parameters =[
    0.0, # Idle, #=0
    0.0, # Busy, #=1
    0.0, # Blocked, #=2
    0.0, # Failed, #=3
    0.0, # Paused, #=4
]
"""
```

The duration of the TDES_OBJECT work in different states.

```
#### DESObject_Time_In_States
self.DESObject_Time_In_States = [0.0,0.0,0.0,0.0,0.0,0.0] # By program
calculated variable
```

The size of the container for the TDES_OBJECT (internal) Entity.

```
self.DESObject_Capacity = 1 #
Input variable
```

Current contents of the TDES_OBJECT (internal) Entity Container. (Current number of Entities.)

```
self.DESObject_Number_Of_Content_Entities = 0
# By program calculated variable
```

Vector of the TDES_OBJECT (internal) Entity Container

```
# count.
self.DESObject_Content_Entities_Vector = [] # By
program calculated variable
```

The simulation time of creating the TDES_OBJECT.

```
self.DESObject_Borning_Time = 0.0 #
By program calculated variable
```

The simulation time of termination (erasure) of the TDES_OBJECT.

```
self.DESObject_Terminate_Time = 0.0
# By program calculated variable
```

The previous update simulation time for the TDES_OBJECT.

```
self.DESObject_Previous_GTime_Now = 0.0
# By program calculated variable
```

Is it the first time TDES_OBJECT run?

```
self.DESObject_First_Calculation_bool = True # By
program calculated variable
```

Variables for calculating the average residence time of TDES_ENTITY objects entering and leaving TDES_OBJECT.

The simulation time of the TDES_ENTITY entering TDES_OBJECT.

```
self.WORKED_Entity_Arrive_Time = 0.0 # By program calculated variable
```

Simulation date of TDES_ENTITY leaving TDES_OBJECT.

```
self.WORKED_Entity_Terminate_Time = 0.0 # By program calculated variable
```

Duration of stay of TDES_ENTITY passing through TDES_OBJECT in TDES_OBJECT.

```
self.WORKED_Entity_Cycle_Time = 0.0 # By program calculated variable
```

Number of measurement data for TDES_OBJECT (tested) attribute

```
self.WORKED_Entity_Sample_Number = 0 # By program calculated variable
```

Sum of measurement data for TDES_OBJECT (tested) attribute

```
self.WORKED_Entity_Sample_Summa = 0.0 # By program calculated variable
```

Average measurement data of the TDES_OBJECT (tested) attribute

```
self.WORKED_Entity_Average_Staying_Time = 0.0 # By program calculated
variable
```

List of length of stay for TDES_OBJECT (examined) attribute

```
self.WORKED_Entity_Staying_Time_list = [] # By program calculated variable
```

Maximum count of TDES_ENTITY in TDES_OBJECT (internal) Entity Container.

```
self.WORKED_Entity_Maximal_Number_in_Queue = 0 # By program calculated
variable
```

The number of measurement points for TDES_ENTITY-k counts in the TDES_OBJECT (internal) Entity container.

```
self.WORKED_Entity_Queue_Sample_Number = 0 # By program calculated
variable
```

The number of TDES_ENTITY s in the TDES_OBJECT (internal) Entity Container.

```
self.WORKED_Entity_Number_in_Queue = 0 # By program calculated variable
```

The sum of the number of TDES_ENTITY s in the TDES_OBJECT (internal) Entity Store for the measurement points studied so far.

```
self.WORKED_Entity_Number_in_Queue_Summa = 0.0 # By program calculated
variable
```

The average count of TDES_ENTITY in the TDES_OBJECT (internal) Entity Store. (until this simulation date)

```
self.WORKED_Entity_Average_Number_in_Queue = 0.0 # By program calculated variable
```

The vector(list) of the histogram formed from the number of TDES_ENTITY s in the (internal) TDE_ENTITY container of the TDES_OBJECT up to this simulation date.

```
self.WORKED_Entity_Numbers_in_Queue_list = [] # By program calculated variable
```

```
"""
Class TDES_CHANNEL:
    #A TDES_CHANNEL the input and output channels of the DES_OBJECT
    # defining object.
    #ID_Number of Data
    DESChannel_Data = -1
    #Type of THIS Channel
    DESChannel_Type = TEnumList(
        TDES_Channel_Type,
        'TChannel_Input')
    #Is THIS Channel connected?
    DESChannel_Is_Connected_bool = False

    # True = the channel is transfer (It leaves to cross on it the Entity)
    # False = the channel is closed (The ENTITY have to wait at the channel entry)
    DESChannel_Is_Enabled_In_PreviousStep_bool = False
    # True = the channel is transfer (It leaves to cross on it the Entity)
    # False = the channel is closed (The ENTITY have to wait at the channel entry)
    DESChannel_Is_Enabled_bool = False

    # Channel Selection Ratio Value -> Have to be POSITIVE value!!
    DESChannel_Selection_Ratio_Value = 0.0
    # Number of flown trough Entities of THIS Channel
    DESChannel_Number_Of_Entities_Flown_Through = 0
    # Priority of THIS Channel between the other Channels at DESObject
    DESChannel_Priority_Of_Channel_Service = 0

    # Type the Channel of DES_Object that is connected to THIS Channel
    DESChannel_Connected_DESObject_ChannelType = TEnumList(
        TDES_Channel_Type,
        'TChannel_Input')
    # Name of Branch that is connected to THIS Channel
    DESChannel_Connected_DESBranch_Name_str = 'CONNECTED_DES_BRANCH_NAME'
    # Name of DESObject that is connected to THIS Channel
    DESChannel_Connected_DESObject_Name_str = 'CONNECTED_DES_OBJECT_NAME'
    # Channel Index of DESObject that is connected to THIS Channel
    DESChannel_Connected_DESObject_Channel_Index = 0
    """
#####
```

Input channels:

Create TDES_OBJECT *input TDES CHANNEL objects* based on the input channel number.

```
if (self.DESObject_Number_Of_InputChannels != 0):

    ##### DESObject_Inputs
    self.DESObject_Inputs = []
    for i in range(self.DESObject_Number_Of_InputChannels):
        # Set Channel start values
        DES_Channel = TDES_CHANNEL()
        DES_Channel.DESChannel_Owner_class = self
```

```

        # Set the input channel type
        DES_Channel.DESChannel_Type.Set_Item_str_to('TChannel_Input')

DES_Channel.DESChannel_Connected_DESObject_ChannelType.Set_Item_str_to('TChannel_Output
')
        self.DESObject_Inputs.append(DES_Channel)

```

The index of the TDES_OBJECT input channel.

```
self.DESObject_InputChannel_Index = 0 # Input variable
```

The index of the TDES_OBJECT input channel in the previous simulation step.

```
self.DESObject_InputChannel_Index_In_PreviousStep = 0 # By program
calculated variable
```

The index of the TDES_OBJECT input channel set.

```

##### DESObject_Setted_InputChannel_Index
self.DESObject_Setted_InputChannel_Index = 0 # Input variable

"""
TDES_Channel_Index_Selection_Strategy_tuple =(
'TSelection_Constant_Index', #=0 (I/O)
'TSelection_Random_Selected_Index', #=1 (I/O)
'TSelection_Cyclical_Selected_Index', #=2 (I/O) Round Robin type selection
'TSelection_First_Available_Index_Start_From_First_Index', #=3 (I/O)
'TSelection_First_Available_Index_Start_From_Last_Index_From_Back', #=4 (I/O)

# DESAttribute_Name_str is "Selected_InputChannel_Index" or
"Selected_OutputChannel_Index"
'TSelection_By_DESObject_User_Attribute', #=5 (I/O)

'TSelection_By_Channel_Ratio_Values', #=6 (I/O)
'TSelection_by_External_Selected_Index', #=7 (I/O)
'TSelection_by_TIdle_State_Of_Connected_DESObject', #=8 (only at Output)
)
"""

```

The selection strategy for the TDES_OBJECT input channel index.

```

self.DESObject_InputChannel_Index_Selection_Strategy =\
    TEnumTuple(
        TDES_Channel_Index_Selection_Strategy_tuple,
        'TSelection_Random_Selected_Index'
    ) # Input variable

```

The count of all TDES_ENTITY objects that have entered the input channels of the TDES_OBJECT (so far).

```

self.DESObject_Number_Of_Input_Entities = 0
# By program calculated variable

```

#####

Output channels

Create TDES_OBJECT output TDES_CHANNEL objects based on the output channel number.

```

if (self.DESObject_Number_Of_OutputChannels != 0):
##### DESObject_Outputs

```

```

        self.DESObject_Outputs = []
        for i in range(self.DESObject_Number_Of_OutputChannels):
            # Set Channel start values
            DES_Channel = TDES_CHANNEL()
            DES_Channel.DESChannel_Owner_class = self
            # Set output channel type
            DES_Channel.DESChannel_Type.Set_Item_str_to('TChannel_Output')

            DES_Channel.DESChannel_Connected_DESObject_ChannelType.Set_Item_str_to('TChannel_Input'
            )

            self.DESObject_Outputs.append(DES_Channel)

```

The index of the TDES_OBJECT output channel.

```

        self.DESObject_OutputChannel_Index = 0
# Input variable#

```

The index of the TDES_OBJECT output channel in the previous simulation step.

```

        self.DESObject_OutputChannel_Index_In_PreviousStep = 0
By program calculated variable
#

```

The index of the TDES_OBJECT output channel set.

```

        self.DESObject_Setted_OutputChannel_Index = 0 # Input variable

```

The selection strategy for the TDES_OBJECT output channel index.

```

        self.DESObject_OutputChannel_Index_Selection_Strategy = \
            TEnumTuple(
                TDES_Channel_Index_Selection_Strategy_tuple,
                'TSelection_Random_Selected_Index'
            ) # Input variable

```

All TDES_ENTITY objects that have entered the TDES_OBJECT output channels (eddid).

```

        self.DESObject_Number_Of_Output_Entities = 0
By program calculated variable
#

```


Geometric parameters

Position values

The position of the TDES_OBJECT in an absolute coordinate system with dimension [m].

```

        self.DESObject_Geometrical_Position = TDESObject_Position =
TDESObject_Position()
# Input variable

```

Speed values

Speed of TDES_OBJECT with dimension [m/s].

```

        self.DESObject_Geometrical_Speed = TDESObject_Speed()
# Input variable

```

Acceleration values

Acceleration of the TDES_OBJECT with dimension [m/s^2].

```

        self.DESObject_Geometrical_Acceleration = TDESObject_Acceleration()
Input variable
#

```

```
#####
#####
#####
# TSOURCE
#####
#####
#####
"""
```

The attributes of the TSOURCE object are described in detail in Section 6.7.1.

```
"""

    if (self.DESObject_Type.Item_str == 'TSOURCE'):
        self.SOURCE_Created_Entity = TDES_ENTITY() #Input variable

        self.SOURCE_First_Time_of_Entity_Creation = 0.0 #
        Input variable

        self.SOURCE_Maximum_Batch_Size = 0
        # Input variable

        # Enties have been produced
        self.SOURCE_Number_Of_Created_Entities = 0 #
        By program calculated variable

        self.SOURCE_Time_Of_Next_Launching = 0.0
        # By program calculated variable

        self.SOURCE_Time_Step = 0.0
        # By program calculated variable

        """
    TDES_Distribution =(
        'TDistribution_Constant_Value', #=0
        'TDistribution_Exponential_Mean', #=1
        'TDistribution_Normal_Mean_Deviation', #=2
        'TDistribution_Triangle_Minimum_Usual_Maximum', #=3
        'TDistribution_Uniform_Minimum_Maximum' #=4
    )
    """
    self.SOURCE_Distribution =\
        TEnumTuple(
            TDES_Distribution_tuple,
            'TDistribution_Constant_Value'
        ) # Input variable

        self.SOURCE_Constant_Value_Of_Time = 10.0
        # Input variable

        self.SOURCE_Mean_Of_Time = 10.0 #
        Input variable

        self.SOURCE_Deviation_Of_Time = 0.0
        # Input variable
```



```

        self.SOURCE_Maximum_Of_Time = 0.0
# Input variable

        self.SOURCE_Usual_Of_Time = 0.0 #
Input variable

        self.SOURCE_Minimum_Of_Time = 0.0
# Input variable

        self.SOURCE_Is_Continuous_Time_Step_Generator_bool = False # boolean
# Input variable

        self.SOURCE_Continuous_Number_of_Time_Steps = 0# integer    k

        self.SOURCE_Continuous_Print_Out_Number = 0# integer    Dk #
Input variable

        self.SOURCE_Continuous_Time_Step = 0.0# double    h #
Input variable

        self.SOURCE_Continuous_Delay_Between_Time_Steps_sec = 0.0#float
Delay_sec    # Input variable

        self.SOURCE_Last_Calculation_Time = 0.0 # By
program calculated variable

0

```

```
#####
#####
#####
# TBUFFER
#####
#####
#####
"""
The attributes of the TBUFFER object are described in detail in Section 6.7.2.
"""

"""
TDES_Queue_Type =(
'TQueue_First_In_First_Out', #=0 FIFO
'TQueue_Last_In_First_Out', #=1 LIFO
'TQueue_Entity_With_Lowest_Priority_Value', #=2
'TQueue_Entity_With_Highest_Priority_Value', #=3
'TQueue_Entity_With_BUFFER_Match_Value'      #=4
)
"""
self.BUFFER_Type_Of_Queue =\
    TEnumTuple(
        TDES_Queue_Type_tuple,
        'TQueue_First_In_First_Out'
    ) # Input variable

self.BUFFER_Maximum_Content = 0
# By program calculated variable

self.BUFFER_Match_Value_str = ''
# Input variable

self.BUFFER_Last_Calculation_Time = 0.0
By program calculated variable #
```

```
#####
#####
#####
# TPATH
#####
#####
#####
"""
```

The attributes of the TPATH object are described in detail in Section 5.7.7.

```
"""
```

```
# self.PATH_Type_Of_Queue =\
# TEnumTuple(
# TDES_Queue_Type_tuple,
# 'TQueue_First_In_First_Out'
# ) # Input variable
```

```
self.PATH_Number_of_Tracks = 6# Input variable
```

```
self.PATH_Used_Tracks = 0 # By
program calculated variable
```

```
self.PATH_Use_Only_Total_Delay_Time = False
# Input variable
```

```
self.PATH_Need_Parameter_Recalculation = True # Input variable
```

```
self.PATH_Start_Position = TDESObject_Position() #
Input variable
```

```
self.PATH_End_Position = TDESObject_Position() # Input variable
```

```
self.PATH_Length = 0.0 # [m] # By program calculated variable
```

```
self.PATH_Acceleration = 1.0 # [m/s^2]
```

```
self.PATH_Constant_Velocity = 1.0 # [m/s]
```

```
self.PATH_Maximal_Velocity_at_Acceleration = 1.0 # [m/s]
```

```
self.PATH_Maximal_Velocity_at_Retardation = 1.0 # [m/s]
```

```
self.PATH_Retardation = -1.0 # [m/s^2]
```

```
self.PATH_Acceleration_Time = 0.0 # [s] # By program calculated variable
```

```
self.PATH_Constant_Velocity_Time = 0.0 # [s] # By program calculated
variable
```

```
self.PATH_Retardation_Time = 0.0 # [s] # By program calculated variable

self.PATH_Total_Delay_Time = 0.0 # [s] # By program calculated variable

self.PATH_Acceleration_Distance = 0.0 # [m] # By program calculated variable

self.PATH_Constant_Velocity_Distance = 0.0 # [m] # By program calculated
variable

self.PATH_Retardation_Distance = 0.0 # [m] # By program calculated variable

self.PATH_Total_Distance = 0.0 # [m] # By program calculated variable

self.PATH_MACHINE_DESObjects = None

self.PATH_Last_Calculation_Time = 0.0 #
By program calculated variable
```

```
#####
#####
#####
# TMACHINE
#####
#####
#####
"""
```

The attributes of the TMACHINE object are described in detail in Section 5.7.3.

```
self.MACHINE_Time_Of_Next_Launching = 0.0 # By program calculated
variable
```

```
self.MACHINE_Time_Step = 0.0
# By program calculated variable
```

```
"""
TDES_Distribution =(
    'TDistribution_Constant_Value', #=0
    'TDistribution_Exponential_Mean', #=1
    'TDistribution_Normal_Mean_Deviation', #=2
    'TDistribution_Triangle_Minimum_Usual_Maximum', #=3
    'TDistribution_Uniform_Minimum_Maximum' #=4
)
"""
self.MACHINE_Distribution =\
    TEnumTuple(
        TDES_Distribution_tuple,
        'TDistribution_Constant_Value'
    ) #Input variable
```

```
self.MACHINE_Constant_Value_Of_Time = 0.0
# Input variable
```

```
self.MACHINE_Mean_Of_Time = 0.0
# Input variable
```

```
self.MACHINE_Deviation_Of_Time = 0.0
# Input variable
```

```
self.MACHINE_Maximum_Of_Time = 0.0
# Input variable
```

```
self.MACHINE_Usual_Of_Time = 0.0 #
Input variable
```

```
self.MACHINE_Minimum_Of_Time = 0.0
# Input variable
```

```
self.MACHINE_Utilization = 0.0
# By program calculated variable
```

```

        self.MACHINE_Last_Calculation_Time = 0.0                                #
By program calculated variable

#####
#####
#####
# TLOCK
#####
#####
#####
    """
The attributes of the TLOCK object are described in detail in Section 5.7.8.
    """

        self.LOCK_Time_Of_Next_Launching = 0.0
# By program calculated variable

        self.LOCK_Time_Step = 0.0                                            #
By program calculated variable

    """
TDES_Distribution =(
    'TDistribution_Constant_Value', #=0
    'TDistribution_Exponential_Mean', #=1
    'TDistribution_Normal_Mean_Deviation', #=2
    'TDistribution_Triangle_Minimum_Usual_Maximum', #=3
    'TDistribution_Uniform_Minimum_Maximum' #=4
)
        self.LOCK_Distribution =\
            TEnumTupel(
                TDES_Distribution_tuple,
                'TDistribution_Constant_Value'
            ) #Input variable

        self.LOCK_Entity_Number_Limit_in_Segment = 1 # By program calculated
variable

        self.LOCK_Maximum_Number_of_Entities_in_Segment = -1 # By program
calculated variable

        self.LOCK_Actual_Number_of_Entities_in_Segment = 0 # By program
calculated variable

        self.LOCK_Utilization = 0.0                                        #
By program calculated variable

        self.LOCK_Last_Calculation_Time+ = 0.0
# By program calculated variable

#####

```

```
#####
#####
# TUNLOCK
#####
#####
#####
"""
The attributes of the TUNLOCK object are described in detail in Section 5.7.9.
"""
```

```
        self.UNLOCK_Time_Of_Next_Launching = 0.0
# By program calculated variable
```

```
        self.UNLOCK_Time_Step = 0.0
# By program calculated variable
```

```
        """
TDES_Distribution =(
    'TDistribution_Constant_Value', #=0
    'TDistribution_Exponential_Mean', #=1
    'TDistribution_Normal_Mean_Deviation', #=2
    'TDistribution_Triangle_Minimum_Usual_Maximum', #=3
    'TDistribution_Uniform_Minimum_Maximum' #=4
)
        """
        self.UNLOCK_Distribution =\
            TEnumTuple(
                TDES_Distribution_tuple,
                'TDistribution_Constant_Value'
            ) #Input variable
```

```
        self.UNLOCK_Utilization = 0.0 # By
program calculated variable
```

```
        self.UNLOCK_Last_Calculation_Time = 0.0
# By program calculated variable
```

```
#####
#####
#####
# TSINK
#####
#####
#####
"""
```

The attributes of the TSINK object are described in detail in Section 5.7.4.

```
"""
```

```
        self.SINK_Last_Content_Entity_ID_Number = 0 # By program calculated
variable
```

```
        self.SINK_Number_Of_Sinked_Entities = 0 #
By program calculated variable
```

```
        self.SINK_Store_Entities_Into_Sinked_EntityList_bool =
GSINK_Store_Entities_Into_Sinked_EntityList_bool # Input
variable
```

```
        self.SINK_Detailed_Sinked_EntityList_bool+ =
GSINK_Detailed_Sinked_EntityList_bool # Input
variable
```

```
        self.SINK_Last_Calculation_Time = 0.0 #
By program calculated variable
```



```
#####
#####
#####
# TWRAPPER
#####
#####
#####
"""
TWRAPPER object attributes are described in detail in Section 5.7.5.
"""

"""
TDES_Wrapper_Step_Sequence=(
'Trapper_Waiting_for_Package', #=0
'Trapper_Package_is_Arrived', #=1
'Trapper_Waiting_for_Packing_Entities', #=2
'Trapper_All_Packing_Entity_is_Arrived', #=3
'Trapper_Waiting_for_Sending_Away_Packed_Entities', #=4
'Trapper_Package_Went_Away' #=5
)
"""
self.WRAPPER_Step_Sequence =\
    TEnumTuple(
        TDES_Wrapper_Step_Sequence_tuple,
        'Trapper_Waiting_for_Package'
    ) # By program calculated variable

"""
TDES_Queue_Type =(
'TQueue_First_In_First_Out',          #=0 FIFO
'TQueue_Last_In_First_Out',           #=1 LIFO
'TQueue_Entity_With_Lowest_Priority_Value', #=2
'TQueue_Entity_With_Highest_Priority_Value', #=3
'TQueue_Entity_With_BUFFER_Match_Value'    #=4
)
"""
self.WRAPPER_Type_Of_Queue =\
    TEnumTuple(
        TDES_Queue_Type_tuple,
        'TQueue_First_In_First_Out'
    ) # Input variable

self.WRAPPER_Entity_Request_At_Channel =[]
if(self.DESObject_Number_Of_InputChannels !=0):
    for i in range(self.DESObject_Number_Of_InputChannels):
        self.WRAPPER_Entity_Request_At_Channel.append(0) # Input variable

self.WRAPPER_Entity_Amount_At_Channel =[]
if(self.DESObject_Number_Of_InputChannels !=0):
    for i in range(self.DESObject_Number_Of_InputChannels):
        self.WRAPPER_Entity_Amount_At_Channel.append(0) # By program calculated
variable

self.WRAPPER_New_Name_of_Package_str = '' # Input variable

self.WRAPPER_Forced_Finish_Of_Collecting_Entities_bool = False
```

```

self.WRAPPER_Delete_Assembled_Entities_bool = False # Input variable

self.WRAPPER_Last_Calculation_Time = 0.0 # By program calculated variable

#####
#####
#####
# TUNWRAPPER
#####
#####
"""
The attributes of the TUNWRAPPER object are described in detail in Section 5.7.6.
"""

"""
TDES_UnWrapper_Step_Sequence=(
    'TUnWrapper_Waiting_for_Packed_Object', #=0
    'TUnWrapper_Object_is_Arrived', #=1
    'TUnWrapper_UnPack_Objects_Into_Buffer', #=2
    'TUnWrapper_Waiting_for_Sending_Away_Objects', #=3
    'TUnWrapper_Objects_Went_Away' #=4
)
"""
self.UNWRAPPER_Step_Sequence =\
    TEnumTuple(
        TDES_UnWrapper_Step_Sequence_tuple,
        'TUnWrapper_Waiting_for_Packed_Object'
    ) # By program calculated variable

"""
TDES_Queue_Type =(
    'TQueue_First_In_First_Out',          #=0 FIFO
    'TQueue_Last_In_First_Out',          #=1 LIFO
    'TQueue_Entity_With_Lowest_Priority_Value', #=2
    'TQueue_Entity_With_Highest_Priority_Value', #=3
    'TQueue_Entity_With_BUFFER_Match_Value' #=4
)
"""
self.UNWRAPPER_Type_Of_Queue =\
    TEnumTuple(
        TDES_Queue_Type_tuple,
        'TQueue_First_In_First_Out'
    ) # Input variable

self.UNWRAPPER_Entity_Amount_At_Channel = [] #
By program calculated variable
if(self.DESObject_Number_Of_OutputChannels !=0):
    for i in range(self.DESObject_Number_Of_OutputChannels):
        self.UNWRAPPER_Entity_Amount_At_Channel.append(0) # By program
calculated variable

self.UNWRAPPER_OutputIndex = 0
# By program calculated variable

```

```
        self.UNWRAPPER_Last_Calculation_Time = 0.0 # By program calculated
variable

    #end of def __init__
#-----
#-----
```

Methods of the TDES_OBJECT object are:**List of methods of TDES_OBJECT**

```
def DESObject_ON_PROCESS_CALL

def DESObject_Set_System_Attribute
def DESObject_Set_User_Attribute

def DESObject_Delete_System_Attribute
def DESObject_Delete_User_Attribute

def DESObject_Get_System_Attribute
def DESObject_Get_User_Attribute

def DESObject_Update_Work_State_with_Commanded_State
def DESObject_Select_Of_InputChannel_Index
def DESObject_Select_Of_OutputChannel_Index
def DESObject_InputChannel_Index_Is_Correct_bool
def DESObject_OutputChannel_Index_Is_Correct_bool
def DESObject_Channel_Is_Connected
def DESObject_Calculate_WORKED_Entity_Time_Attributes

def DESObject_ON_EXTERNAL_InputChannel_Index_Selection
def DESObject_ON_EXTERNAL_OutputChannel_Index_Selection
```

```
#####
#####
# This procedure is running at start of simulation program.
#(2)
def DESObject_ON_PROCESS_CALL(
    self
    Function_Name_str='function', # call by value //'function' is a dummy
value+

    Function_Parameter1_num = 0, # call by value
    Function_Parameter2_str = '', # call by value
    Function_Parameter3_str = '', # call by value

    # Python Output:
    # -
    ):
    """
Implements a call to TDES_OBJECT process.
    """

#.....
# Python program elements
#.....

#end of def DESObject_ON_PROCESS_CALL
#-----

#####
#####
def DESObject_Set_System_Attribute(
    self
    Name_Of_Attribute_str,
    Value_Of_Attribute_str,

    # Python Output:
    # -
    ):
    """
This procedure allows you to set the system attribute of the TDES_OBJECT object.
    """

#.....
# Python program elements
#.....

#end of def DESObject_Set_System_Attribute
#-----

#####
#####
def DESObject_Set_User_Attribute (
    self
    Name_Of_Attribute_str,
    Value_Of_Attribute_str,

    # Python Output:
    # -
    ):
    """
```

This procedure allows you to set the user attribute of the TDES_OBJECT object.

```

"""
#.....
# Python program elements
#.....

#end of def DESObject_Set_User_Attribute
#-----

```

```

#####
#####
def DESObject_Delete_System_Attribute(
    self
    Name_Of_Attribute_str,

    # Python Output:
    # return [ Deleted_object_sys_attr,
    # Erasing_Is_OK_bool,
    # Information_Message_str]
    ):
    """

```

This procedure allows you to delete the system attribute of the TDES_OBJECT object.

```

"""
"""
Class TDES_OBJECT_SYSTEM_ATTRIBUTE:
    def __init__(self):
        DESAttribute_Name_str ='' # index=0
        DESAttribute_Value_str ='' # index=1
        """

#.....
# Python program elements
#.....

#end of def DESObject_Erase_System_Attribute
#-----

```

```

#####
#####
def DESObject_Delete_User_Attribute(
    self
    Name_Of_Attribute_str,

    # Python Output:
    # return [Deleted_object_user_attr,
    # Erasing_Is_OK_bool,
    # Information_Message_str]
    ):
    """

```

This procedure allows you to delete the user attribute of the TDES_OBJECT object.

```

"""
"""
Class TDES_OBJECT_USER_ATTRIBUTE:
    def __init__(self):
        DESAttribute_Name_str ='' # index=0
        DESAttribute_Value_str ='' # index=1
        """

#.....

```

```

# Python program elements
#.....

#end of def DESObject_Erase_User_Attribute
#-----

#####
#####
def DESObject_Get_System_Attribute(
    self
    Name_Of_Attribute_str,

    # Python Output:
    # return [object_sys_attr,
    # Getting_Is_OK_bool,
    # Information_Message_str]
    ):
    """
    This procedure allows you to read the system attribute of the TDES_OBJECT object.
    """
    """
Class TDES_OBJECT_SYSTEM_ATTRIBUTE:
    def __init__(self):
        DESAttribute_Name_str = '' # index=0
        DESAttribute_Value_str = '' # index=1
    """

#.....
# Python program elements
#.....

#end of def DESObject_Get_System_Attribute
#-----

#####
#####
def DESObject_Get_User_Attribute(
    self
    Name_Of_Attribute_str = ''

    # Python Output:
    # return [object_user_attr,
    # Getting_Is_OK_bool,
    # Information_Message_str]
    ):
    """
    This procedure reads the user attribute of the TDES_OBJECT object.
    """
    """
Class TDES_OBJECT_USER_ATTRIBUTE:
    def __init__(self):
        DESAttribute_Name_str = '' # index=0
        DESAttribute_Value_str = '' # index=1
    """

#.....
# Python program elements
#.....

#end of def DESObject_Get_User_Attribute

```

```

#-----

#####
#####
def DESObject_Update_Work_State_with_Commanded_State(
    self
    # self.DESObject_Commanded_State_In_Previous_Step,
    # self.DESObject_Commanded_State,

    # Python Output:
    # return [self.DESObject_Work_State]
    ):
    """
    This procedure creates the working state (Work_State) of the object from the commanded
    state (Commanded_State) of the TDES_OBJECT object.
    """

    """
    TDES_Commanded_State =(
        'TCommanded_Enabled_State', #=0
        'TCommanded_Failed_State', #=1
        'TCommanded_Paused_State' #=2
    )

    TDES_Work_State =(
        'TIdle', #=0          The object is waiting, able to work, but has no task.
        'TBusy', #=1         The object is working on the ENTITY object it contains.
        'TBlocked', #=2      The object has completed its own task, but you cannot
                             add another task to //.
        'TFailed', #=3       The object cannot work because //has failed.
        'TPaused' #=4        The object is workable, but does not perform work and
                             waiting to replace the failed
        Object.
    )
    """

#.....
# Python program elements
#.....

#end of def DESObject_Update_Work_State_with_Commanded_State
#-----

#####
#####
# The procedure selects an input channel (channel index)
# from which data can be read (the channel data value is not empty!).

def DESObject_Select_Of_InputChannel_Index(
    self
    InputChannel_Strategy, #TDES_Channel_Index_Selection_Strategy
    DES_Entity_in, #TDES_ENTITY

    # Python Output:
    # return [ChannelIndex_In_PreviousStep,
    # ChannelIndex,
    # ChannelIndex_Is_Valid_bool]
    ):
    """

```


The procedure defines the index of an input channel for the TDES_OBJECT object based on the specified index selection strategy (TDES_Channel_Index_Selection_Strategy).

```

"""
"""

TDES_Channel_Index_Selection_Strategy_tuple =(
'TSelection_Constant_Index', #=0 (I/O)
'TSelection_Random_Selected_Index', #=1 (I/O)
'TSelection_Cyclical_Selected_Index',      #=2 (I/O) Round Robin type selection
'TSelection_First_Available_Index_Start_From_First_Index', #=3 (I/O)
'TSelection_First_Available_Index_Start_From_Last_Index_From_Back', #=4 (I/O)

# DESAttribute_Name_str is "Selected_InputChannel_Index" or
"Selected_OutputChannel_Index"
'TSelection_By_DESObject_User_Attribute', #=5 (I/O)

'TSelection_By_Channel_Ratio_Values', #=6 (I/O)
'TSelection_by_External_Selected_Index', #=7 (I/O)
'TSelection_by_TIdle_State_Of_Connected_DESObject', #=8 (only at Output)
'TSelection_by_DESEntity_Priority_Value', #=9 (only at Output of TBUFFER)
'TSelection_by_DESEntity_Given_Name_str', #=10 (only at Output)
)
"""

#.....
# Python program elements
#.....

#end of def DESObject_Select_Of_InputChannel_Index
#-----

```

```

#####
#####
# The procedure selects an output channel (channel index)
# to which data can be written (the channel is (now) empty!).

```

```

def DESObject_Select_Of_OutputChannel_Index(
    self
    OutputChannel_Strategy, #TDES_Channel_Index_Selection_Strategy
    DES_Entity_out, #TDES_ENTITY

    # Python Output:
    # return [ChannelIndex_In_PreviousStep,
    # ChannelIndex,
    # ChannelIndex_Is_Valid_bool]
):
    """

```

The procedure determines the index of an output channel for the TDES_OBJECT object based on the specified index selection strategy (TDES_Channel_Index_Selection_Strategy).

```

"""
"""

TDES_Channel_Index_Selection_Strategy_tuple =(
'TSelection_Constant_Index', #=0 (I/O)
'TSelection_Random_Selected_Index', #=1 (I/O)
'TSelection_Cyclical_Selected_Index',      #=2 (I/O) Round Robin type selection
'TSelection_First_Available_Index_Start_From_First_Index', #=3 (I/O)
'TSelection_First_Available_Index_Start_From_Last_Index_From_Back', #=4 (I/O)

# DESAttribute_Name_str is "Selected_InputChannel_Index" or
"Selected_OutputChannel_Index"
'TSelection_By_DESObject_User_Attribute', #=5 (I/O)

```

```

'TSelection_By_Channel_Ratio_Values', #=6 (I/O)
'TSelection_by_External_Selected_Index', #=7 (I/O)
'TSelection_by_TIdle_State_Of_Connected_DESObject', #=8 (only at Output)
'TSelection_by_DESEntity_Priority_Value', #=9 (only at Output of TBUFFER)
'TSelection_by_DESEntity_Given_Name_str', #=10 (only at Output)
)
    """

#.....
# Python program elements
#.....

#end of def DESObject_Select_Of_OutputChannel_Index
#-----

#####
#####
def DESObject_InputChannel_Index_Is_Correct_bool(
    self
    Channel_Index,

    # Python Output:
    #return InputIndexIsCorrect_bool
    ):
    """
    This procedure checks the selected input channel index value of the TDES_OBJECT object.
    """

#.....
# Python program elements
#.....

#end of def DESObject_InputChannel_Index_Is_Correct_bool
#-----

#####
#####
def DESObject_OutputChannel_Index_Is_Correct_bool(
    self
    Channel_Index,

    # Python Output:
    #return OutputIndexIsCorrect_bool
    ):
    """
    This procedure checks the index value of the selected output channel for the
    TDES_OBJECT object.
    """

#.....
# Python program elements
#.....

#end of def DESObject_OutputChannel_Index_Is_Correct_bool
#-----

#####

```

```
#####
def DESObject_Channel_Is_Connected(
    self
    Channel_Type, # TDES_Channel_Type, 'TChannel_Input', #=0
                  # 'TChannel_Output' #=1

    Channel_Index= 0,

    # Python Output:
    # return [self.Channel_Is_Not_Connected_OK]
    ):
    """
```

The procedure examines whether the selected channel of the TDES_OBJECT object is connected to another channel.

```
#####
#.....
# Python program elements
#.....
```

```
#end of def DESObject_Channel_Is_Connected
```

```
#-----
```

```
#####
#####
def DESObject_Calculate_WORKED_Entity_Time_Attributes(
    self
    Time_Now,

    # Python Output:
    # return None
    ):
    """
```

The procedure updates statistics for the Entity currently being processed in the TDES_OBJECT object at the moment it runs.

```
#####
#.....
# Python program elements
#.....
```

```
#end of def DESObject_Calculate_WORKED_Entity_Time_Attributes
```

```
#-----
```

```
#####
#####
# DES_OBJECT requests an external input channel index calculation.
def DESObject_ON_EXTERNAL_InputChannel_Index_Selection(
    self
```

```

    # Python Output:
    #return [ChannelIndex_In_PreviousStep,
    # ChannelIndex,
    # ChannelIndex_Is_Valid_bool]
    ):
    """
```

This procedure is performed on a selected TDES_OBJECT when calculating an external input channel index for TDES_OBJECT.

```
#####
#.....
# Python program elements
```

```

#.....

#end of def ON_EXTERNAL_InputChannel_Index_Selection_of_DESObject
#-----

#####
# DES_OBJECT requests an external output channel index calculation.
def DESObject_ON_EXTERNAL_OutputChannel_Index_Selection(
    self

    # Python Output:
    #return [ChannelIndex_In_PreviousStep,
    # ChannelIndex,
    # ChannelIndex_Is_Valid_bool]
    ):
    """
    This procedure is performed on a selected TDES_OBJECT when calculating an external
    output channel index for TDES_OBJECT.
    """

#.....
# Python program elements
#.....

#end of def ON_EXTERNAL_OutputChannel_Index_Selection_of_DESObject
#-----

#end of TDES_OBJECT
#-----
#-----
#-----

```

6.7.3 TSOURCE object attributes

In the description, **attributes** appear in red bold, while **methods** appear in blue bold.

The TDES_OBJECT/TSOURCE object does:

- The task of the **TSOURCE** DES object is to *emit Entity (**TDES_ENTITY**) objects* into the simulation system model.
- After creating the **TSOURCE** object, it is placed in a Python list object and referenced in the simulation program by the name of the DES object (for example, 'Source1'), its ID_Number value, or its index in DESObjectList.
- The TSOURCE object is **self.SOURCE_Time_Step** emits (creates) a **TDES_ENTITY** object with a specified time specified by its parameter, which is introduced into the simulation system, **self.DESObject_Capacity** = 1.

If the **self.DESObject_Capacity** > is 1 and is *an integer*, **TSOURCE** will emit as many Entities as self at the Entity issuance date. DESObject_Capacity value. If you have not run out of Entities from TSOURCE by the next Entity issuance date, you will only create enough Entities to use the **self.DESObject_Content_Entities_Vector** count of Entities plus count of newly created Entities is **self.DESObject_Capacity** value.

It only creates so many Entities that it is always **self.DESObject_Capacity** number of Entities must be at the time the Entities are issued.

- The TSOURCE object provides the parallel **CSS (Continuous Simulation System)** system with the ability to update the objects of the CSS system at the given simulation time.

To define the TDES_OBJECT/TSOURCE object:

To create a DES object of type **TSOURCE** in DES Python as follows:

```
LSource = TDES_OBJECT(
    TSOURCE,          # Type of DES object,
    'Source1',        # Name the DES object,
    0,                 # Number of input channels,
    6                  # Number of output channels
)
```

where:

LSource	the name of the created TDES_OBJECT , which is a pointer to an object of type TDES_OBJECT ,
'TSOURCE'	Type of TDES_OBJECT
'Source1'	The reference name of the object in the simulation program
0,	the number of input channels to the object
6,	Number of output channels of the object

An object of type **TSOURCE** *has no input channels*, since its main task as an entity generator is to create and emit entities based on input parameters. Therefore, we have set the input channel number to 0, but this value is not used.

The output channel number is 6 in the previous sample example, but this parameter value can be any positive integer.

Attributes of the TDES_OBJECT/TSOURCE object:

This attribute is an object of type TDES_ENTITY that allows you to create an Entity assigned to the TSOURCE object and set its attributes.

```
if (self.DESObject_Type.Item_str == 'TSOURCE'):
    self.SOURCE_Created_Entity = TDES_ENTITY() #Input variable
```

This attribute sets the simulation time from which TSOURCE starts issuing Entities (simulation time).

```
self.SOURCE_First_Time_of_Entity_Creation = 0.0 # Input variable
```

This attribute sets the amount of Entity that the TSOURCE object emits when the simulation model runs. When the DES object has reached its maximum number of Entity emissions, it will no longer emit Entity(s).

```
self.SOURCE_Maximum_Batch_Size = 0 # Input variable
```

This attribute specifies the number of Entities emitted by the TSOURCE object at the time the variable was queried.

```
self.SOURCE_Number_Of_Created_Entities = 0 # By program calculated variable
```

This attribute specifies the simulation point in time at which the TSOURCE object will emit the next Entity(s).

```
self.SOURCE_Time_Of_Next_Launching = 0.0 # By program calculated variable
```

This attribute specifies the simulation time step at which the TSOURCE object will emit the next Entity(s).

```
self.SOURCE_Time_Step = 0.0 # By program calculated variable
```

```
"""
TDES_Distribution =(
    'TDistribution_Constant_Value', #=0
    'TDistribution_Exponential_Mean', #=1
    'TDistribution_Normal_Mean_Deviation', #=2
    'TDistribution_Triangle_Minimum_Usual_Maximum', #=3
    'TDistribution_Uniform_Minimum_Maximum' #=4
)
"""
```

This attribute specifies the distribution function type that the TSOURCE object will use to emit the Entity(s).

```
self.SOURCE_Distribution =\
    TEnumTuple(
        TDES_Distribution_tuple,
        'TDistribution_Constant_Value'
    ) # Input variable
```

This attribute allows you to set the simulation duration of emissions for the 'TDistribution_Constant_Value' distribution function type of the TSOURCE object.

```
self.SOURCE_Constant_Value_Of_Time = 10.0# Input variable
```

This attribute allows you to set the simulation average time of emissions (simulation duration) for the 'TDistribution_Exponential_Mean' and 'TDistribution_Normal_Mean_Deviation' distribution function types of the TSOURCE object.

```
self.SOURCE_Mean_Of_Time = 10.0# Input variable
```

This attribute allows you to set the simulation standard deviation time (simulation duration) for the TSOURCE object's 'TDistribution_Normal_Mean_Deviation' distribution function type.

```
self.SOURCE_Deviation_Of_Time = 0.0 # Input variable
```

This attribute allows the TSOURCE object to 'TDistribution_Triangle_Minimum_Usual_Maximum' and 'TDistribution_Uniform_Minimum_Maximum' for distribution function types, set the maximum simulation duration for emissions (simulation duration).

```
self.SOURCE_Maximum_Of_Time = 0.0 # Input variable
```

This attribute allows you to set the standard simulation duration for emissions (simulation duration) for the TSOURCE object function type 'TDistribution_Triangle_Minimum_Usual_Maximum' and distribution functions.

```
SOURCE_Minimum_Of_Time < SOURCE_Usual_Of_Time < SOURCE_Maximum_Of_Time
```

```
self.SOURCE_Usual_Of_Time = 0.0 # Input variable
```

This attribute allows the TSOURCE object to 'TDistribution_Triangle_Minimum_Usual_Maximum' and 'TDistribution_Uniform_Minimum_Maximum' for distribution function types, set the minimum simulation duration for emissions (simulation duration).

```
self.SOURCE_Minimum_Of_Time = 0.0 # Input variable
```

This attribute allows the TSOURCE object to be used as a clock generator in DES Python when simulating a continuous/sampling system (CSS = Continuous Simulation System).

```
self.SOURCE_Is_Continuous_Time_Step_Generator_bool = False # boolean Input variable
```

This attribute specifies the step at which the CSS clock generator implemented with the TSOURCE object takes it. Denoted by k. Simulation time = k*h, where h is the sampling time of the continuous system.


```
self.SOURCE_Continuous_Number_of_Time_Steps = 0# integer      k # Input variable
```

This attribute specifies the frequency of output of CSS system results implemented with the TSOURCE object to the screen (data file). For example, if this attribute has a value of 10, only every 10th result is written to the screen (file).

```
self.SOURCE_Continuous_Print_Out_Number = 0 # integer dk # input variable
```

This attribute specifies the value of the simulation time step of the CSS clock generator implemented with the TSOURCE object. Denoted by h . Simulation time = $k \cdot h$, where k is the step count (simulation duration) of the sampling clock generator of the continuous system.

```
self.SOURCE_Continuous_Time_Step = 0.0# doubleh# Input variable
```

This attribute specifies the amount of real-time time delay in seconds that is executed after calculating simulation time steps for the CSS clock generator implemented with the TSOURCE object. Real-time latency is supported by . SOURCE_Continuous_Print_Out_Number occurs after a specified number of steps with the attribute (real duration).

```
self.SOURCE_Continuous_Delay_Between_Time_Steps_sec = 0.0#float Delay_sec#input variable
```

This attribute specifies the last simulation time at which the state variables of the TSOURCE object were updated (simulation time).

```
self.SOURCE_Last_Calculation_Time = 0.0 # By program calculated variable
```

6.7.4 TBUFFER object attributes

In the description, **attributes** appear in red bold, while **methods** appear in blue bold.

The TDES_OBJECT/TBUFFER object does:

- The **TBUFFER** DES object is used to temporarily store Entity (TDES ENTITY) objects in the simulation system model.
- After creating the **TBUFFER** object, it is placed in a Python list object and referenced in the simulation program by the name of the DES object (for example, 'Buffer1'), its ID_Number value, or its index in DESObjectList.
- The **TBUFFER** object implements staging storage of entity objects received at its input,
 - if they cannot proceed further in the simulation system due to the occupancy of the object linked to the output.
 - The **TBUFFER** object is **self.DESObject_Capacity** parameter specifies the maximum number of Entities that can be stored in the object.

To define the TDES_OBJECT/TBUFFER object:

To create a DES object of type **TBUFFER** in DES Python as follows:

```
LBuffer = TDES_OBJECT(
    TBUFFER,          # Type of DES object,
    'Buffer1',        # Name the DES object,
    6,                # Number of input channels,
    6                 # Number of output channels
)
```

where:

LBuffer	the name of the created TDES_OBJECT , which is a pointer to an object of type TDES_OBJECT ,
TBUFFER	Type of TDES_OBJECT
'Buffer1'	The reference name of the object in the simulation program
6,	the number of input channels to the object
6,	Number of output channels of the object

The **TBUFFER** object has input and output channels because it is responsible for staging incoming entities.

The input channel number is 6 in the previous sample example, but this parameter value can be any positive integer.

The output channel number is 6 in the previous sample example, but this parameter value can be any positive integer.

Attributes of the TDES_OBJECT/TBUFFER object:

This attribute specifies how the TBUFFER object selects the Entity stored in the DES object to emit in its output in the next step.

```
TDES_Queue_Type_tuple =(
```

The TQueue_First In First Out TBUFFER object type is called *tunnel memory*. The Entity that entered the TBUFFER object first will exit the TBUFFER DES object first.

```
'TQueue_First_In_First_Out', #=0 FIFO
```

The TQueue_Last In First Out TBUFFER object type is called *bag memory*. The Entity that last entered the TBUFFER object will exit the TBUFFER DES object first.

```
'TQueue_Last_In_First_Out', #=1 LIFO
```

The TBUFFER object type property of the TQueue_Entity_With_Lowest_Priority_Value (Entity with Lowest Priority) is to select the Entity with the lowest priority value from among the Entities stored in the object when the DES object is updated. This Entity becomes the Entity exiting TBUFFER.

```
'TQueue_Entity_With_Lowest_Priority_Value', #=2
```

The TBUFFER object type property of TQueue_Entity_With_Highest_Priority_Value (Entity with Top Priority) is to select the Entity with the highest priority value from among the Entities stored in the object when the DES object is updated. This Entity becomes the Entity exiting TBUFFER.

```
'TQueue_Entity_With_Highest_Priority_Value', #=3
```

The TBUFFER object type property of the TQueue_Entity_With_BUFFER_Match_Value_str (Entity equal to the Match_Value_str value of TBUFFER) is that, when the DES object is updated, it selects from the Entities stored in the object the Entity whose .DESEntity_Match_Value_str attribute contains the same string value as the TBUFFER object.

```
'TQueue_Entity_With_BUFFER_Match_Value_str' #=4
```

```
)
"""
```

The Entity container type of the TBUFFER object. A variable is an Enumerated Constants structure implemented in a Python environment. The Enumerated Constants type contains listed values, which are possible values for this type of variable. In this case, specify the Entity container type of the TBUFFER DES object with this data type. If you want to give this type of variable a value other than the possible Enumerated Constants listed above, it returns an error message and lists in the error message which possible variable values it accepts for this variable type.

The buffer type of the BUFFER object.

```
self.BUFFER_Type_Of_Queue =\
TEnumTuple(
TDES_Queue_Type_tuple,
TQueue_First_In_First_Out'
) # Input variable
```

The maximum number of Entities in the Entity container of the TBUFFER object during the simulation duration. With this variable defined during the simulation period, we can determine whether the Entity container size allocated with the Capacity attribute is determined correctly.

```
self.BUFFER_Maximum_Content = 0 # By program calculated variable
```

A special attribute of the TBUFFER object that is used to select from the Entities stored in the buffer the one that has the same string value. The Entity object has a self.DSEntity_Match_Value_str = '' attribute with which the comparison is made.

```
self.BUFFER_Match_Value_str = '' # Input variable
```

This attribute specifies the simulation time at which the state variables of the TBUFFER object were last updated.

```
self.BUFFER_Last_Calculation_Time = 0.0 # By program calculated variable
```

6.7.5 TMACHINE object attributes

In the description, **attributes** appear in red bold, while **methods** appear in blue bold.

The TDES_OBJECT/TMACHINE object does:

- The task of the **TMACHINE** DES object is to delay the progress of the Entity (**TDES_ENTITY**) object in the simulation system model by a specified amount of time.
- After creating the **TMACHINE** object, it is placed in a Python list object and referenced in the simulation program by its ID_Number value by the name of the DES object (for example, 'Machine1') or by its index in DESObjectList.
- The **TMACHINE** object is **self.MACHINE_Time_Step** parameter delays the further progress of the entity object received at its input in the simulation system by a specified amount of time.
- The **self.DESObject_Capacity** attribute, which must be a positive integer of 1 or greater, specifies how many **TMACHINE** objects will function in parallel.

To define the TDES_OBJECT/TMACHINE object:

To create a DES object of type **TMACHINE** in DES Python as follows:

```
LMachine = TDES_OBJECT(
    TMACHINE,      # Type of DES object,
    'Machine1',    # Name the DES object,
    12,            # Number of input channels,
    4              # Number of output channels
)
```

where:

LMachine	the name of the created TDES_OBJECT , which is a pointer to an object of type TDES_OBJECT ,
TMACHINE	Type of TDES_OBJECT
'Machine1'	The reference name of the object in the simulation program
12,	the number of input channels to the object
4,	Number of output channels of the object

The **TMACHINE** object has input and output channels because it is responsible for delaying incoming Entities by a specified amount of time.

The input channel number is set to 12 values in the previous sample example, but this parameter value can be any positive integer.

The output channel number is set to 4 in the previous sample example, but this parameter value can be any positive integer.

Attributes of the TDES_OBJECT/TMACHINE object:

This attribute specifies when the TMACHINE object *emits the Entity it receives as input*. This is the simulation time of the Entity release.
Its value can be ONLY POSITIVE FAIR VALUE!

```
self.MACHINE_Time_Of_Next_Launching = 0.0 # By program calculated variable
```

This attribute specifies *the amount of simulation time that the TMACHINE object delays the progress of the received Entity*. This is the simulation time step for the Entity release.
Its value can be ONLY POSITIVE FAIR VALUE!

```
self.MACHINE_Time_Step = 0.0 # By program calculated variable
```

This attribute specifies the amount of simulation time that the TMACHINE object delays the progress of the received Entity. This is the simulation time step for the Entity release.
Its value can be ONLY POSITIVE FAIR VALUE!

```
"""
TDES_Distribution_tuple =(
    'TDistribution_Constant_Value', #=0
    'TDistribution_Exponential_Mean', #=1
    'TDistribution_Normal_Mean_Deviation', #=2
    'TDistribution_Triangle_Minimum_Usual_Maximum', #=3
    'TDistribution_Uniform_Minimum_Maximum' #=4
)
"""
```

This attribute specifies the distribution function type that the TMACHINE object will use to delay the progression of the Entity(s).

```
self.MACHINE_Distribution =\
    TEnumTupel(
        TDES_Distribution_tuple,
        'TDistribution_Constant_Value'
    ) #Input variable
```

This attribute allows you to set the simulation duration of the delay(s) for the TMACHINE object's 'TDistribution_Constant_Value' distribution function type.

```
self.MACHINE_Constant_Value_Of_Time = 0.0 # Input variable
```

This attribute allows you to set the simulation mean time of the delay(s) for the 'TDistribution_Exponential_Mean' and 'TDistribution_Normal_Mean_Deviation' distribution function types of the TMACHINE object (simulation duration).

```
self.MACHINE_Mean_Of_Time = 0.0 # Input variable
```

This attribute allows you to set the simulation standard deviation time (simulation duration) of the delay(s) for the TMACHINE object TDistribution_Normal_Mean_Deviation distribution function type.

```
self.MACHINE_Deviation_Of_Time = 0.0 # Input variable
```

This attribute allows the TMACHINE object to TDistribution_Triangle_Minimum_Usual_Maximum' and 'TDistribution_Uniform_Minimum_Maximum' for Distribution function types, set the maximum simulation duration of the delay(s) (simulation duration).

```
self.MACHINE_Maximum_Of_Time = 0.0 # Input variable
```


This attribute allows you to set the standard simulation duration of emissions (simulation duration) for the TMACHINE object function type 'TDistribution_Triangle_Minimum_Usual_Maximum' and distribution functions. MACHINE_Minimum_Of_Time < MACHINE_Usual_Of_Time < MACHINE_Maximum_Of_Time

```
self.MACHINE_Usual_Of_Time = 0.0 # Input variable
```

This attribute allows the TMACHINE object to 'TDistribution_Triangle_Minimum_Usual_Maximum' and 'TDistribution_Uniform_Minimum_Maximum' for distribution function types, set the minimum simulation duration for emissions (simulation duration).

```
self.MACHINE_Minimum_Of_Time = 0.0 # Input variable
```

This attribute specifies the *utilization factor [%]* (0..100%) for the TMACHINE object. The utilization factor is the DES object's time spent solving a task divided by the total simulation duration multiplied by 100 percent.

```
self.MACHINE_Utilization = 0.0 # By program calculated variable
```

This attribute specifies the last simulation time at which the state variables of the TMACHINE object were updated (simulation time).

```
self.MACHINE_Last_Calculation_Time = 0.0 # By program calculated variable
```

6.7.6 TSINK object attributes

In the description, **attributes** appear in red bold, while **methods** appear in blue bold.

The TDES_OBJECT/TSINK object does:

- The task of the **TSINK** DES object is to eliminate (delete) Entity (**TDES ENTITY**) objects from the simulation system model.
- After creating the **TSINK** object, it is placed in a Python list object and referenced in the simulation program by the name of the DES object (for example, 'Sink1'), its ID_Number value, or its index in DESObjectList.
- The **TSINK** object implements the elimination (deletion) of Entity objects received at its input, but if the Entity object received at the input contains additional Entity objects (or they may contain additional Entity objects), the **TSINK** object removes all Entity objects from the system.

To define the TDES_OBJECT/TSINK object:

To create a DES object of type **TSINK** in DES Python in the following way:

```
LSink = TDES_OBJECT(
    TSINK,      # Type of DES object,
    'Sink1',    # Name the DES object,
    8,          # Number of input channels,
    0           # Number of output channels
)
```

where:

LSink	the name of the created TDES_OBJECT , which is a pointer to an object of type TDES_OBJECT ,
TSINK	Type of TDES_OBJECT
'Sink1'	The reference name of the object in the simulation program
8,	the number of input channels to the object
0,	Number of output channels of the object

The **TSINK** object has only input channels because it terminates (deletes) incoming Entities in the simulation system.

The input channel number is set to 8 in the previous sample example, but this parameter value can be any positive integer.

The output channel count in the previous sample example is set to 0 because this DES object has NO OUTPUT channels and this value is not used.

Attributes of the TDES_OBJECT/TSINK object:

This attribute specifies the ID Numer with which Entity the TSINK object performed the termination.

```
self.SINK_Last_Content_Entity_ID_Number = 0 # By program calculated variable
```

This attribute specifies the number of Entity deprovisioning (deletion) accomplished by the TSINK object at the given simulation date.

```
self.SINK_Number_Of_Sinked_Entities = 0 # By program calculated variable
```

This Boolean attribute allows the TSINK object to place (store) deleted Entities in the SINKED_ENTITYLIST data structure.

The GSINK_Store_Entities_Into_Sinked_EntityList_bool variables are stored in the TDES_TYPES.py library and have an effect on the entire simulation program.

```
self.SINK_Store_Entities_Into_Sinked_EntityList_bool = GSINK_Store_Entities_Into_Sinked_EntityList_bool # Input variable
```

This Boolean attribute gives the TSINK object permission to place (store) contained Entities in deleted Entities in the SINKED_ENTITYLIST data structure.

The GSINK_Detailed_Sinked_EntityList_bool variable is stored in the TDES_TYPES.py directory and its effect applies to the entire simulation program.

```
self.SINK_Detailed_Sinked_EntityList_bool = GSINK_Detailed_Sinked_EntityList_bool # Input variable
```

This attribute specifies the simulation time at which the state variables of the TSINK object were last updated.

```
self.SINK_Last_Calculation_Time = 0.0 # By program calculated variable
```

6.7.7 TWRAPPER object attributes

In the description, **attributes** appear in red bold, while **methods** appear in blue bold.

The TDES_OBJECT/TWRAPPER object does:

- The task of the **TWRAPPER** DES object is to implement the bundling of Entity (**TDES_ENTITY** objects) in the simulation system model.
 - The object is a model of a box in which a specific number of parts per channel is placed from different inputs. In the following DES objects, only the box Entity will be moved, but the box Entity will naturally contain (remain) the packaged part Entities.
- After creating the **TWRAPPER** object, it is placed in a Python list object and referenced in the simulation program by the name of the DES object ('Wrapper1'), its ID_Number value, or its index in DESObjectList.
 - The **TWRAPPER** object implements the packaging of entity objects received at its input,
 - The **TWRAPPER** object waits for its inputs to arrive first with a packet (box Entity) object (type TDES_ENTITY) on input 0, and then a specified amount of **TDES_ENTITY** objects (**WRAPPER_Request_At_Channel[i]**) on the different input channels (component entities).
 - Input with index 0 (zero) is where the container box entity (**Package**) arrives. Inputs with index (**i =1..DESObject_Number_Of_InputChannels**) are used to arrive at the part entities to be packaged. The quantities to be packaged required for the input channels are given in vector **WRAPPER_Request_At_Channel[i]**.
 - **TDES_ENTITY** objects contain the channel through which they were received in the **TWRAPPER** object in the **Wrapper_Channel_Number_Of_Arrive** user attribute.
 - Output **DESObject_Outputs[0]** (output channel 0) leaves the packaged Entity (box = **Packed_Entity**).

Operational notes:

=====

- Entities wrapped with the **TWRAPPER** object can be unpacked ONLY with the **TUNWRAPPER** object!
- The **New_Name_of_Package_str** contains the new name for the packaged object. If the string is empty (''), no name changes are made, otherwise the name of the box (**Package**) object will change to the new name specified.

To define the TDES_OBJECT/TWRAPPER object:

To create a DES object of type **TWRAPPER** in DES Python as follows:

```
LWrapper = TDES_OBJECT(
    TWRAPPER,      # Type of DES object,
    'Wrapper1',    # Name the DES object,
    6,             # Number of input channels,
    1              # Number of output channels
)
```

where:

LWrapper	the name of the created TDES_OBJECT , which is a pointer to an object of type TDES_OBJECT ,
TWRAPPER	Type of TDES_OBJECT
'Wrapper1'	The reference name of the object in the simulation program
6,	the number of input channels to the object
1,	Number of output channels of the object

An object of type **TWRAPPER** has input and output channels because it is responsible for packing incoming entities.

The input channel number is 6 in the previous sample example, but this parameter value can be any positive integer.

For the output channel number in the previous sample example, a value of 1 was specified, this parameter value is a constant value of one (1) due to the operation of the object.

Attributes of the TDES_OBJECT/TWRAPPER object:

```

"""
TDES_Wrapper_Step_Sequence=(
    'TWrapper_Waiting_for_Package', #=0
    'TWrapper_Package_is_Arrived', #=1
    'TWrapper_Waiting_for_Packing_Entities', #=2
    'TWrapper_All_Packing_Entity_is_Arrived', #=3
    'TWrapper_Waiting_for_Sending_Away_Packed_Entities', #=4
    'TWrapper_Package_Went_Away' #=5
)
"""

```

This attribute specifies which of the wrapping steps in the TWRAPPER object we are at.

```

self.WRAPPER_Step_Sequence =\
    TEnumTuple(
        TDES_Wrapper_Step_Sequence_tuple,
        'TWrapper_Waiting_for_Package'
    ) # By program calculated variable

```

```

"""
TDES_Queue_Type =(
    'TQueue_First_In_First_Out', #=0 FIFO
    'TQueue_Last_In_First_Out', #=1 LIFO
    'TQueue_Entity_With_Lowest_Priority_Value', #=2
    'TQueue_Entity_With_Highest_Priority_Value', #=3
    'TQueue_Entity_With_BUFFER_Match_Value' #=4
)
"""

```

This attribute specifies the Entity Container type in the TWRAPPER object. This parameter is only formally displayed because the object independently determines which entity from the container will be selected and transmitted.

```

self.WRAPPER_Type_Of_Queue =\
    TEnumTuple(
        TDES_Queue_Type_tuple,
        'TQueue_First_In_First_Out'
    ) # Input variable

```

This attribute specifies the number of claimed TDES_ENTITY in the packet for each input to the TWRAPPER object. The parameter is a vector-type structure, with integer positive values for each index that specify how many Entities for a given channel should be passed through to a package.

```

self.WRAPPER_Entity_Request_At_Channel =[]

if(self.DESObject_Number_Of_InputChannels !=0):
    for i in range(self.DESObject_Number_Of_InputChannels):
        self.WRAPPER_Entity_Request_At_Channel.append(0) # Input variable

```

This attribute specifies how many pieces of TDES_ENTITY have already been received for each input to the TWRAPPER object. The parameter is a vector-type structure, some indices of which contain positive values of integer type.

```

self.WRAPPER_Entity_Amount_At_Channel =[]
if(self.DESObject_Number_Of_InputChannels !=0):
    for i in range(self.DESObject_Number_Of_InputChannels):
        self.WRAPPER_Entity_Amount_At_Channel.append(0) # By program calculated
variable

```

This attribute specifies that the TWRAPPER object specifies what the package entity will have a *new name* after packaging. If the attribute is empty sting (""), the old name of the Package Entity is preserved!

```
self.WRAPPER_New_Name_of_Package_str = '' # Input variable
```

This Boolean attribute requires the TWRAPPER object to immediately stop collecting the part Entities and forward to the Package Entity with the Entities collected so far.

```
self.WRAPPER_Forced_Finish_Of_Collecting_Entities_bool = False # Input variable
```

This Boolean attribute requires the TWRAPPER object to delete component Entities when they are received and allow only the Package Entity to continue.

The object "plays" the entire gathering process, but does not carry forward received (virtually-packaged) Entities.

```
self.WRAPPER_Delete_Assembled_Entities_bool = False # Input variable
```

This attribute specifies the last simulation time at which the TWRAPPER object's state variables were updated (simulation time).

```
self.WRAPPER_Last_Calculation_Time = 0.0 # By program calculated variable
```


6.7.8 TUNWRAPPER object attributes

In the description, **attributes** appear in red bold, while **methods** appear in blue bold.

The TDES_OBJECT/TUNWRAPPER object does:

- The task of the **TUNWRAPPER** DES object is to implement the unpacking of the packaged Entity (**TDES_ENTITY**) objects in the simulation system model.
 - The **TUNWRAPPER** object extracts the packet entity (Packed_Entities) received at its input to the object's outputs with index (**i = 1..DESObject_Number_Of_OutputChannels**).
 - Input with index 0 (zero) arrives at the packaged Entity (**Packed_Entity**).
 - Wrapped entity objects contain in the '**Wrapper_Channel_Number_Of_Arrive**' user attribute which output channel they leave the **TUNWRAPPER** object.
 - The wrapped Entities leave the **TUNWRAPPER** object first, and the package Entity (**Package_Entity**) last.

Operational notes:

=====

- The **TUNWRAPPER** object can be used to unpack ONLY Entities that are packaged with the **TWRAPPER** object!
- If the Entity DOES NOT have a user attribute named '**Wrapper_Channel_Number_Of_Arrive**', it will leave the **TUNWRAPPER** object in output 0!
- If the incoming entity (**Packed_Entity**) on input 0 does not contain any wrapped Entities, it will leave the **TUNWRAPPER** object on output 0 without performing any unwrapping operations!

To define the TDES_OBJECT/TUNWRAPPER object:

To create a DES object of type **TUNWRAPPER** in DES Python as follows:

```
LUnWrapper = TDES_OBJECT(
    TUNWRAPPER,      # Type of DES object,
    'UnWrapper1',    # Name the DES object,
    1,               # Number of input channels,
    10               # Number of output channels
)
```

where:

LUnWrapper	the name of the created TDES_OBJECT , which is a pointer to an object of type TDES_OBJECT ,
TUNWRAPPER	Type of TDES_OBJECT
'UnWrapper1'	The reference name of the object in the simulation program
1,	the number of input channels to the object
10,	Number of output channels of the object

The **TUNWRAPPER** object has input and output channels because it is responsible for unpacking incoming entities.

For the input channel number, in the previous sample example, 1. Formally specified parameter because **TUNWRAPPER** always unpacks only one packaged Entity.

The output channel number is set to 10 in the previous sample example, but this parameter value can be any positive integer. If an incoming Entity to be unpacked requires fewer outputs (fewer types of parts contain an Entity), no unpacked Entity will appear in the remaining outputs.

Attributes of the TDES_OBJECT/TUNWRAPPER object are:

```

"""
TDES_UnWrapper_Step_Sequence=(
    'TUnWrapper_Waiting_for_Packed_Object', #=0
    'TUnWrapper_Object_is_Arrived', #=1
    'TUnWrapper_UnPack_Objects_Into_Buffer', #=2
    'TUnWrapper_Waiting_for_Sending_Away_Objects', #=3
    'TUnWrapper_Objects_Went_Away' #=4
)
"""

```

This attribute specifies which of the wrapping steps in the TUNWRAPPER object we are at.

```

self.UNWRAPPER_Step_Sequence =\
    TEnumTuple(
        TDES_UnWrapper_Step_Sequence_tuple,
        'TUnWrapper_Waiting_for_Packed_Object'
    ) # By program calculated variable

```

```

"""
TDES_Queue_Type =(
    'TQueue_First_In_First_Out',          #=0 FIFO
    'TQueue_Last_In_First_Out',          #=1 LIFO
    'TQueue_Entity_With_Lowest_Priority_Value', #=2
    'TQueue_Entity_With_Highest_Priority_Value', #=3
    'TQueue_Entity_With_BUFFER_Match_Value' #=4
)
"""

```

This attribute specifies the Entity Container type in the TUNWRAPPER object. This parameter is only formally displayed because the object independently determines which entity from the container will be selected and transmitted.

```

self.UNWRAPPER_Type_Of_Queue =\
    TEnumTuple(
        TDES_Queue_Type_tuple,
        'TQueue_First_In_First_Out'
    ) # Input variable

```

This attribute specifies how many TDES_ENTITY have already left the package at each output of the TUNWRAPPER object (when a package is unpacked). The parameter is a vector-type structure, some indices of which contain positive values of integer type.

```

self.UNWRAPPER_Entity_Amount_At_Channel = [] # By program calculated
variable
if(self.DESObject_Number_Of_OutputChannels !=0):
    for i in range(self.DESObject_Number_Of_OutputChannels):
        self.UNWRAPPER_Entity_Amount_At_Channel.append(0) # By program
calculated variable

```

This attribute specifies which output channel (indexed channel of the output channel) of the TUNWRAPPER object the last Entity Left.

```

self.UNWRAPPER_OutputIndex = 0 # By program calculated variable

```

This attribute specifies the last simulation time at which the state variables of the TUNWRAPPER object were updated (simulation time).

```

self.UNWRAPPER_Last_Calculation_Time = 0.0 # By program calculated
variable

```

6.7.9 TPATH object attributes

In the description, **attributes** appear in red bold, while **methods** appear in blue bold.

The TDES_OBJECT/TPATH object does:

- The purpose of the **TPATH** DES object is to delay the progress of Entity (**TDES ENTITY**) objects in the simulation system model by using an **N-MACHINE** DES object.
 - An object is a model of a multi-lane highway in which multiple Entities can simultaneously move from one input to one of the outputs of LPath in adjacent lanes.
 - The **TPATH** DES object consists of two basic DES objects: a tpath_control object with properties similar to the **TBUFFER** type and a **TMACHINE** DES object.
 - The **tpath_control** object takes the amount of delay time from the geometry of the path. The object's **PATH_Number_of_Tracks** attribute specifies how many lanes there will be on a multilane road. This integer value is also copied to the **DESObject_Capacity** attribute of the **TMACHINE** object. The delay time defined from geometry data is also copied into the **TMACHINE** object **MACHINE_ConstantValue_Of_Time** and **MACHINE_Mean_Of_Time attributes**. (Why only these because they are the ones we use most often.)
 - The **TMACHINE** object is an object that performs a N_Machine type of delay in which the value of N is set by using the DESObject_Capacity attribute. With the specified delay duration, the TMACHINE. **TDistribution_Exponential_Mean** you set up a sublist, you specify a custom delay duration for each worker item.

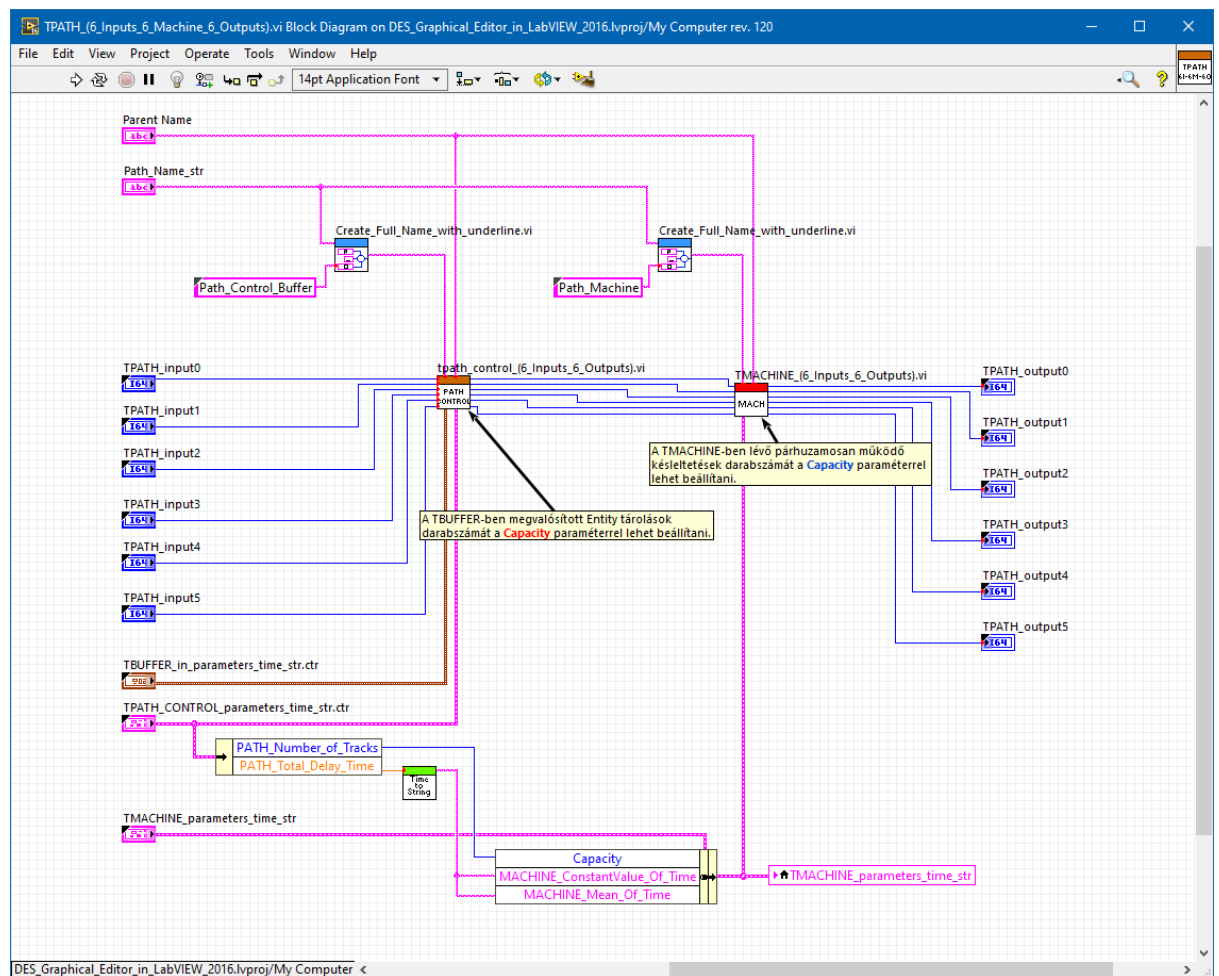


Figure 6.7.7.118 Diagram panel of TDES_OBJECT/TPATH object with single-wire inputs and outputs
(6 inputs and 6 outputs)

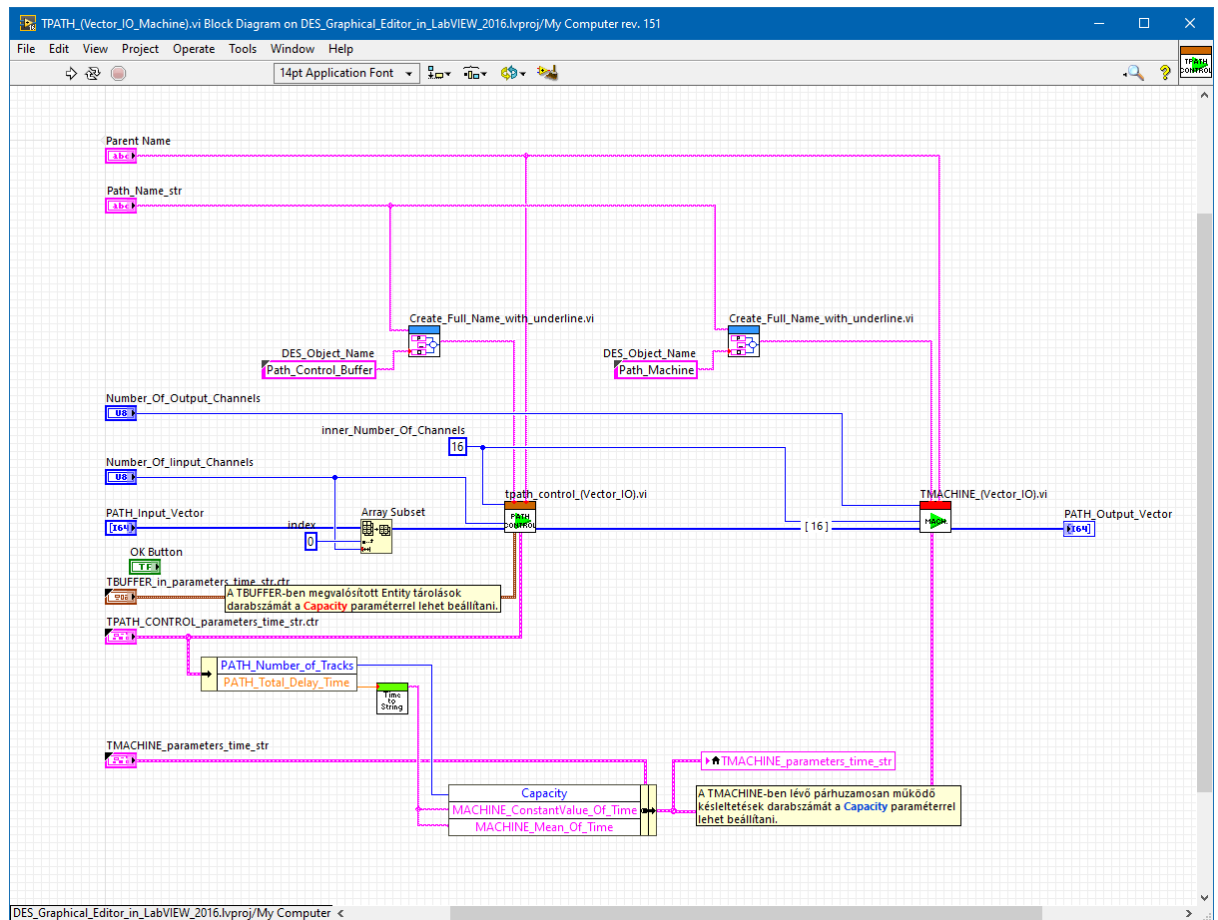


Figure 6.7.7.119 Diagram panel of the TDES_OBJECT/TPATH object with vector inputs and outputs
(any number of inputs and outputs)

TPATH input parameters:

TPATH_CONTROL_parameters_time_str_ctr

PATH_Length [m]	PATH_Number_of_Tracks [I]
10,000	6

PATH_Acceleration [m/s**2]	PATH_Constant_Velocity [m/s]	PATH_Retardation [m/s**2]
1,000	1,000	-1,000

PATH_Need_Parameter_Recalculation_bool

NO

PATH_Total_Delay_Time [s]
10,000

Figure 6.7.7.120 Geometric parameters of the TPATH object

Input parameters for tpath / tbuffer:

TBUFFER_in_parameters_time_str.ctr

BUFFER_Type_Of_Queue TQueue_First_In_First_Out	InputChannel_Index 0	InputChannel_Index_Selection_Strategy TSelection_Random_Selected_Index
Capacity 10	OutputChannel_Index 0	OutputChannel_Index_Selection_Strategy TSelection_by_TIdle_State_Of_Connected_DESObject

Figure 6.7.7.121 Input parameters for the TBUFFER object portion of the TDES_OBJECT/TPATH object

Input parameters for tpath / tmachine:

TMACHINE_parameters_time_str

MACHINE_Distribution TDistribution_Constant_Value	MACHINE_ConstantValue_Of_Time 0:00:00:01.000	MACHINE_Maximum_Of_Time 0:00:00:03.000
Capacity 1	MACHINE_Mean_Of_Time 0:00:00:01.000	MACHINE_Usual_Of_Time 0:00:00:02.000
InputChannel_Index_Selection_Strategy TSelection_Random_Selected_Index	MACHINE_Deviation_Of_Time 0:00:00:01.000 hour:minute:second.xxx	MACHINE_Minimum_Of_Time 0:00:00:01.000 hour:minute:second.xxx
InputChannel_Index 0	OutputChannel_Index_Selection_Strategy TSelection_Random_Selected_Index	OutputChannel_Index 0

Figure 6.7.7.122 Input parameters for the TMACHINE object portion of the TDES_OBJECT/TPATH object

- After the **TPATH** object is created, it is placed in a Python list object and referenced in the simulation program by the name of the DES object ('Path1'), its ID_Number value, or its index in DESObjectList.
- The **TPATH** object implements a delay in the further progress of entity objects received at its input,
 - The **DESObject_Capacity** parameter in the **TBUFFER** portion of the **TPATH** object specifies the maximum number of **TDES_ENTITY** that can be stored (on hold) in the object.
 - The **DESObject_Capacity** parameter in the **TMACHINE** portion of the **TPATH** object specifies the maximum number of **TDES_ENTITY** that are delayed in parallel in the object.

To define the TDES_OBJECT/TPATH object:

To create a DES object of type **TPATH** in DES Python as follows:

```
LPath = TDES_OBJECT(
    TPATH,      # Type of DES object,
    'Path1',    # Name the DES object,
    11,         # Number of input channels,
    13          # Number of output channels
)
```

where:

LPath	the name of the created TDES_OBJECT , which is a pointer to an object of type TDES_OBJECT ,
TPATH	Type of TDES_OBJECT
'Path1'	The reference name of the object in the simulation program
11,	the number of input channels to the object
12,	Number of output channels of the object

A **TPATH** object has input and output channels because its job is to delay the progress of incoming entities.

The input channel number is set to 11 in the previous sample example, but this parameter value can be any positive integer.

The output channel number is set to 12 in the previous sample example, but this parameter value can be any positive integer.

Attributes of the TDES_OBJECT/TPATH object:

The attributes of the DES object of type tpath_control is:

This attribute specifies the number of segments in the path in the tpath_control object. This is how many TDES_ENTITY the route can receive, after which no more entering Entities are allowed.

```
self.PATH_Number_of_Tracks = 6# Input variable
```

This attribute specifies the number of segments used in the tpath_control object during the simulation. This is normally less than the number of segments available. The (calculated) system variable defined by the simulation model!

```
self.PATH_Used_Tracks = 0 # By program calculated variable
```

This is a Boolean attribute that allows only the total imaging time value to be applied to the tpath_control object and not to calculate the delay duration based on geometric parameters.

```
self.PATH_Use_Only_Total_Delay_Time_bool = False # Input variable
```

This attribute specifies the initial geometric position (Entity entry point) of the tpath_control object using the TDESObject_Position() data structure.

The TDESObject_Position data structure is defined as follows:

```
#####
Class TDESObject_Position:
    """
```

The TDESObject_Position class stores the position of DESObject.

```
    """
    def __init__(self):
        self.X_coordinate = 0.0
        self.Y_coordinate = 0.0
        self.Z_coordinate = 0.0
```

```
#end of class TDESObject_Position
```

```
#-----
self.PATH_Start_Position = TDESObject_Position() # Input variable
```

This attribute specifies the geometric position of the tpath_control object exit point using the TDESObject_Position() data structure.

```
self.PATH_End_Position = TDESObject_Position() # Input variable
```

This attribute specifies the length of the path modeled by the tpath_control object with dimension [m].

The path length is determined using the PATH_Start_Position and PATH_End_Position attributes using a 3D distance determination algorithm as straight distances between two points. I haven't activated this algorithm yet (2020-09-11 there are no DESObject positions), so you need to specify its value as an input parameter with dimension [m].

```
self.PATH_Length = 0.0 # [m] # By program calculated variable
```

This attribute specifies what the tpath_control object is modeled in the path with the Entity acceleration [m/s^2] dimension.

Acceleration accelerates the Entity from a state of 0 [m/s].

```
self.PATH_Acceleration = 1.0 # [m/s^2]
```

This attribute specifies what the Entity constant rate [m/s] is in the path modeled by the tpath_control object.

```
self.PATH_Constant_Velocity = 1.0 # [m/s]
```

This attribute specifies what the maximum rate of entities is [m/s] on the path modeled by the tpath_control object . This information is important because sometimes the path shortness may cause the Entity to fail to reach the value specified by the PATH_Constant_Velocity.

```
self.PATH_Maximal_Velocity_at_Acceleration = 1.0 # [m/s]
```

This attribute specifies what the maximum rate of entities is [m/s] on the path modeled by the tpath_control object . This information is important because sometimes the path shortness may cause the Entity to fail to reach the value specified by the PATH_Constant_Velocity.

```
self.PATH_Maximal_Velocity_at_Retardation = 1.0 # [m/s]
```

This attribute specifies what the tpath_control object is modeled on with the Entity Deceleration [m/s²] dimension.

Deceleration starts deceleration of the Entity from a state of PATH_Constant_Velocity or PATH_Maximal_Velocity_at_Retardation [m/s].

Deceleration is a negative real value with dimension [m/s²].

```
self.PATH_Retardation = -1.0 # [m/s^2]
```

This attribute specifies the magnitude of duration of entities during acceleration on the path modeled by the tpath control object with dimension [s].

```
self.PATH_Acceleration_Time = 0.0 # [s] # By program calculated variable
```

This attribute specifies the magnitude of the duration of entities in constant velocity motion on the path modeled by the tpath control object with dimension [s].

```
self.PATH_Constant_Velocity_Time = 0.0 # [s] # By program calculated variable
```

This attribute specifies the amount of time an entity has to slow down on the path modeled by the tpath control object with dimension [s].

```
self.PATH_Retardation_Time = 0.0 # [s] # By program calculated variable
```

This attribute specifies what the total time spent on entities in the path modeled by the tpath_control object is with the Magnitude of Total Time Spent on Entities dimension [s].

```
self.PATH_Total_Delay_Time = 0.0 # [s] # By program calculated variable
```

This attribute specifies the distance traveled during acceleration on the path modeled by the tpath control object with dimension [m].

```
self.PATH_Acceleration_Distance = 0.0 # [m] # By program calculated variable
```

This attribute specifies the distance traveled at constant speed with dimension [m] on the path modeled by the tpath_control object.

```
self.PATH_Constant_Velocity_Distance = 0.0 # [m] # By program calculated variable
```

This attribute specifies the distance traveled during deceleration *on the path modeled by the tpath_control object* with dimension [m].

```
self.PATH_Retardation_Distance = 0.0 # [m] # By program calculated variable
```

This attribute specifies the total distance traveled *with dimension [m]* on the path modeled by the tpath_control object.

```
PATH_Total_Distance (total distance travelled) = PATH_Acceleration_Distance +  
PATH_Constant_Velocity_Distance +  
PATH_Retardation_Distance
```

```
self.PATH_Total_Distance = 0.0 # [m] # By program calculated variable
```

This attribute specifies the path address of the TMACHINE object applied to the path modeled by the tpath_control object.

```
self.PATH_MACHINE_DESObjects = None
```

This attribute specifies the last simulation time at which the state variables of the tpath_control object was last updated (simulation time).

```
self.PATH_Last_Calculation_Time = 0.0 # By program calculated variable
```

The **attributes of the DES object of type TBUFFER** are:

This attribute specifies how the TBUFFER object selects the Entity stored in the DES object to emit in its output in the next step.

"""

TDES_Queue_Type_tuple =(

The **TQueue_First In First Out** TBUFFER object type is called tunnel memory. The Entity that entered the TBUFFER object first will exit the TBUFFER DES object first.

'TQueue_First_In_First_Out', #=0 FIFO

The **TQueue_Last In First Out** TBUFFER object type is called bag memory. The Entity that last entered the TBUFFER object will exit the TBUFFER DES object first.

'TQueue_Last_In_First_Out', #=1 LIFO

The TBUFFER object type property of the **TQueue_Entity_With_Lowest_Priority_Value** (Entity with Lowest Priority) is to select the Entity with the Lowest priority value from among the Entities stored in the object when the DES object is updated. This Entity becomes the Entity exiting TBUFFER.

'TQueue_Entity_With_Lowest_Priority_Value', #=2

The TBUFFER object type property of **TQueue_Entity_With_Highest_Priority_Value** (Entity with Top Priority) is to select the Entity with the highest priority value from among the Entities stored in the object when the DES object is updated. This Entity becomes the Entity exiting TBUFFER.

'TQueue_Entity_With_Highest_Priority_Value', #=3

The **TBUFFER object type property of the TQueue_Entity_With_BUFFER_Match_Value** (Entity equal to the Match_Value value of TBUFFER) is that when you update the DES object, it selects from the Entities stored in the object the Entity whose . DESEntity_Match_Value_str attribute contains the same string value as the TBUFFER object.

'TQueue_Entity_With_BUFFER_Match_Value' #=4

)

"""

The Entity container type of the TBUFFER object. The variable is an Enumerated Constants structure implemented in a Python environment. The Enumerated Constants type contains listed values, which are possible values for this type of variable. In this case, specify the Entity container type of the TBUFFER DES object with this data type. If you want to give this type of variable a value other than the possible Enumerated Constants listed above, it returns an error message and lists in the error message which possible variable values it accepts for this variable type.

The buffer type of the BUFFER object.

```
self.BUFFER_Type_Of_Queue =\
TEnumTuple(
TDES_Queue_Type_tuple,
'TQueue_First_In_First_Out'
) # Input variable
```

The maximum number of Entities in the Entity container of the TBUFFER object during the simulation duration. With this variable defined during the simulation period, we can determine whether the Entity container size allocated with the Capacity attribute is determined correctly.

self.**BUFFER_Maximum_Content** = 0 # By program calculated variable

A special attribute of the TBUFFER object that is used to select from the Entities stored in the buffer the one that has the same string value. The Entity object has a self.DESEntity_Match_Value_str = '' attribute with which the comparison is made.

```
self.BUFFER_Match_Value_str = '' # Input variable
```

This attribute specifies the simulation time at which the state variables of the TBUFFER object were last updated.

```
self.BUFFER_Last_Calculation_Time = 0.0 # By program calculated variable
```

The **attributes of the DES object type** TMACHINE are:

This attribute specifies when the TMACHINE object emits the Entity it receives as input. This is the simulation time of the Entity release.
Its value can be ONLY POSITIVE FAIR VALUE!

```
self.MACHINE_Time_Of_Next_Launching = 0.0 # By program calculated variable
```

This attribute specifies the amount of simulation time that the TMACHINE object delays the progress of the received Entity. This is the simulation time step for the Entity release.

Its value can be ONLY POSITIVE FAIR VALUE!

```
self.MACHINE_Time_Step = 0.0 # By program calculated variable
```

This attribute specifies the amount of simulation time that the TMACHINE object delays the progress of the received Entity. This is the simulation time step for the Entity release.

Its value can be ONLY POSITIVE FAIR VALUE!

```
"""
TDES_Distribution_tuple =(
    'TDistribution_Constant_Value', #=0
    'TDistribution_Exponential_Mean', #=1
    'TDistribution_Normal_Mean_Deviation', #=2
    'TDistribution_Triangle_Minimum_Usual_Maximum', #=3
    'TDistribution_Uniform_Minimum_Maximum' #=4
)
"""
```

This attribute specifies the distribution function type that the TMACHINE object will use to delay the progression of the Entity(s).

```
self.MACHINE_Distribution =\
    TEnumTuple(
        TDES_Distribution_tuple,
        'TDistribution_Constant_Value'
    ) #Input variable
```

This attribute allows you to set the simulation duration of the delay(s) for the TMACHINE object's 'TDistribution_Constant_Value' distribution function type.

```
self.MACHINE_Constant_Value_Of_Time = 0.0 # Input variable
```

This attribute allows you to set the simulation mean time of the delay(s) for the 'TDistribution_Exponential_Mean' and 'TDistribution_Normal_Mean_Deviation' distribution function types of the TMACHINE object (simulation duration).

```
self.MACHINE_Mean_Of_Time = 0.0 # Input variable
```

This attribute allows you to set the simulation standard deviation time (simulation duration) of the delay(s) for the TMACHINE object's distribution function type 'TDistribution_Normal_Mean_Deviation'.

```
self.MACHINE_Deviation_Of_Time = 0.0 # Input variable
```

This attribute allows the TMACHINE object to 'TDistribution_Triangle_Minimum_Usual_Maximum' and 'TDistribution_Uniform_Minimum_Maximum' for Distribution function types, set the maximum simulation duration of the delay(s) (simulation duration).

```
self.MACHINE_Maximum_Of_Time = 0.0 # Input variable
```

This attribute allows you to set the standard simulation duration of emissions (simulation duration) for the TMACHINE object function type 'TDistribution_Triangle_Minimum_Usual_Maximum' and distribution functions. MACHINE_Minimum_Of_Time < MACHINE_Usual_Of_Time < MACHINE_Maximum_Of_Time

```
self.MACHINE_Usual_Of_Time = 0.0 # Input variable
```

This attribute allows the TMACHINE object to 'TDistribution_Triangle_Minimum_Usual_Maximum' and 'TDistribution_Uniform_Minimum_Maximum' for distribution function types, set the minimum simulation duration for emissions (simulation duration).

```
self.MACHINE_Minimum_Of_Time = 0.0 # Input variable
```

This attribute specifies the utilization factor [%] (0..100%) for the TMACHINE object. The utilization factor is the DES object's time spent solving a task divided by the total simulation duration multiplied by 100 percent.

```
self.MACHINE_Utilization = 0.0 # By program calculated variable
```

This attribute specifies the last simulation time at which the state variables of the TMACHINE object were updated (simulation time).

```
self.MACHINE_Last_Calculation_Time = 0.0 # By program calculated variable
```

6.7.10 TLOCK object attributes

In the description, **attributes** appear in red bold, while **methods** appear in blue bold.

The TDES_OBJECT/TLOCK object does:

- The task of the **TLOCK** DES object is to limit the number of Entity (**TDES ENTITY**) objects in a given part of the simulation system model.
- The **TLOCK** object's **LOCK_Time_Step** parameter delays the progress of the input Entity object in the simulation system by a specified amount of time. (**LOCK_Time_Step** = **0.0** is the currently set value!)
- For each Entity entering input channel 0, the object is. **LOCK_Actual_Number_of_Entities_in_Segment** attribute value is incremented by one.
- The input channel 0 (zero) of the **TLOCK** object is called the data input channel. The data output channel is the 0th (zeroth) output channel of the **TLOCK** object.
 - Output channel 1 of the **TLOCK** object must be linked to the Entity Delimiter object exiting the segment, which is an **TUNLOCK** object (**information channel**).
 - If the **LOCK_Actual_Number_of_Entities_in_Segment** value equal to or greater than **LOCK_Entity_Number_Limit_in_Segment** attribute value, it closes input channel 0 of the object from further Entity traffic and does not allow any more Entities to pass.
 - Input channel 0 is opened when an Entity passes through the **TUNLOCK** object connected to output channel 1 of the **TLOCK** object, that is, exits the managed part (model segment).
 - The **LOCK_Maximum_Number_of_Entities_in_Segment** attribute specifies the maximum number of Entities in the segment during the simulation.

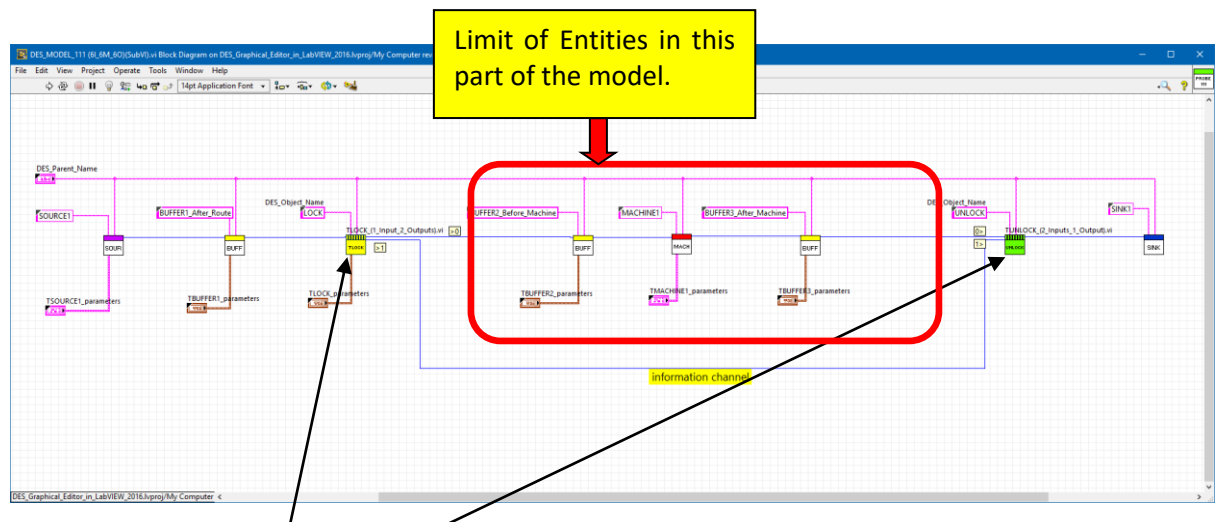


Figure 6.7.8.123 Diagram panel for sample TLOCK to TUNLOCK objects

To define the TDES_OBJECT/TLOCK object:

To create a DES object of type **TLOCK** in DES Python as follows:

```
LLock = TDES_OBJECT(
    TLOCK,      # Type of DES object,
    'Lock1',    # Name the DES object,
    1,          # Number of input channels,
    2           # Number of output channels
)
```

where:

LLock	the name of the created TDES_OBJECT , which is a pointer to an object of type TDES_OBJECT ,
TLOCK	Type of TDES_OBJECT
'Lock1'	The reference name of the object in the simulation program
1,	the number of input channels to the object
2,	Number of output channels of the object

A **TLOCK** object has input and output channels because its job is to limit the number of incoming entities in each simulation segment.

For the input channel number, a value of 1 in the sample example is a condition for the correct operation of the object.

For the output channel number in the sample example, a value of 2 is a condition for the correct operation of the object.

Attributes of the TDES_OBJECT/TLOCK object:

This attribute specifies the simulation time at which the next Entity will exit the TLOCK object.

```
self.LOCK_Time_Of_Next_Launching = 0.0 # By program calculated variable
```

This attribute specifies the simulation time step that will exit the next Entity *from the TLOCK object*.

```
self.LOCK_Time_Step = 0.0 # By program calculated variable
```

```
"""
TDES_Distribution =(
    'TDistribution_Constant_Value', #=0
    'TDistribution_Exponential_Mean', #=1
    'TDistribution_Normal_Mean_Deviation', #=2
    'TDistribution_Triangle_Minimum_Usual_Maximum', #=3
    'TDistribution_Uniform_Minimum_Maximum' #=4
)
"""
```

This attribute specifies the *type of distribution function* for the TLOCK object.

```
self.LOCK_Distribution =\
    TEnumTupel(
        TDES_Distribution_tuple,
        'TDistribution_Constant_Value'
    ) #Input variable
```

This attribute specifies *how many Entities the TLOCK object allows to enter the restricted model segment*.

What is the maximum number of Entities in the segment.

```
self.LOCK_Entity_Number_Limit_in_Segment = 1 #Input variable
```

This attribute specifies the maximum number of Entity counts on the TLOCK object so far.

```
self.LOCK_Maximum_Number_of_Entities_in_Segment = -1 # By program
calculated variable
```

This attribute specifies the current count of Entities that have passed through the TLOCK object so far.

```
self.LOCK_Actual_Number_of_Entities_in_Segment = 0 # By program
calculated variable
```

This attribute specifies the *utilization factor* [%] (0..100%) for the TLOCK object. The utilization factor is the DES object's time spent solving a task divided by the total simulation duration multiplied by 100 percent.

```
self.LOCK_Utilization = 0.0 # By program calculated variable
```

This attribute specifies the last simulation time at which the state variables of the TLOCK object were updated (simulation time).

```
self.LOCK_Last_Calculation_Time = 0.0 # By program calculated variable
```


6.7.11 TUNLOCK object attributes

In the description, **attributes** appear in red bold, while **methods** appear in blue bold.

The TDES_OBJECT/TUNLOCK object does:

An object of type **TUNLOCK** *has input and output channels because its job is to verify that Entities (**TDES ENTITY**) continue to progress.*

The value of the input channel number is 2, which is a condition for the correct operation of the object.

The output channel number is set to 1, which is a condition for the correct operation of the object.

- After creating the **TUNLOCK** object, it is placed in a Python list object and referenced in the simulation program by the name of the DES object ('UnLock1'), its ID_Number value, or its index in DESObjectList.
- The **TUNLOCK** object implements the verification of the further progress of Entity objects received at its input,
 - The **TUNLOCK** object delays the progress of the input Entity object in the simulation system by the amount of time specified by its '**UNLOCK_Time_Step**' attribute. (**UNLOCK_Time_Step = 0.0** set value!)
 - Input channel 0 of the **TUNLOCK** object is the data input channel.
 - Input channel 1 of the **TUNLOCK** object is the validation channel that connects to the peer **TLOCK** object's output channel 1. The purpose of this connection is for the **TUNLOCK** object to be able to access the attributes of the **TLOCK** object attached to it.
 - For each Entity that enters the **TUNLOCK** object on input channel 0, it reduces the value of the attribute '**LOCK_Actual_Number_of_Entities_in_Segment**' of the associated **TLOCK** object on input channel 1 by one.

To define the TDES_OBJECT/TUNLOCK object:

To create a DES object of type **TUNLOCK** in DES Python as follows:

```
LUnLock = TDES_OBJECT(
    TUNLOCK,          # Type of DES object,
    'UnLock1',        # Name the DES object,
    2,                # Number of input channels,
    1                  # Number of output channels
)
```

where:

LUnLock	the name of the created TDES_OBJECT , which is a pointer to an object of type TDES_OBJECT ,
TUNLOCK	Type of TDES_OBJECT
'UnLock1'	The reference name of the object in the simulation program
2,	the number of input channels to the object
1,	Number of output channels of the object

Attributes of the TDES_OBJECT/TUNLOCK object:

This attribute specifies the simulation time at which the next Entity will exit the TUNLOCK object.

```
self.UNLOCK_Time_Of_Next_Launching = 0.0 # By program calculated variable
```

This attribute specifies the simulation time step that will exit the next Entity from the TUNLOCK object.

```
self.UNLOCK_Time_Step = 0.0 # By program calculated variable
```

```
"""
TDES_Distribution =(
'TDistribution_Constant_Value', #=0
'TDistribution_Exponential_Mean', #=1
'TDistribution_Normal_Mean_Deviation', #=2
'TDistribution_Triangle_Minimum_Usual_Maximum', #=3
'TDistribution_Uniform_Minimum_Maximum' #=4
)
"""
```

This attribute specifies the type of distribution function for the TUNLOCK object.

```
self.UNLOCK_Distribution =\
    TEnumTuple(
        TDES_Distribution_tuple,
        'TDistribution_Constant_Value'
    ) #Input variable
```

This attribute specifies the utilization factor [%] (0..100%) for the TUNLOCK object. The utilization factor is the DES object's time spent solving a task divided by the total simulation duration multiplied by 100 percent.

```
self.UNLOCK_Utilization = 0.0 # By program calculated variable
```

This attribute specifies the last simulation time at which the state variables of the TUNLOCK object were updated (simulation time).

```
self.UNLOCK_Last_Calculation_Time = 0.0 # By program calculated variable
```

6.8 TDES_BRANCH object attributes and methods

In the description, **attributes** appear in red bold, while **methods** appear in blue bold.

6.8.1 The task of the TDES_BRANCH object is:

The **TDES_BRANCH** object contains all other objects required to run a standalone simulation model in the DES Python simulation system.

The **TDES_BRANCH** object contains the following main elements:

- storage vector of **TDES_OBJECT** s, (**DESBranch_DESObjectList**)
- storage vector of **TDES_CONNECTION** s, (**DESBranch_DESConnectionList**)
- storage vector of **TDES_TASK** s, (**DESBranch_DESTaskList**)

The owner object of the **TDES_BRANCH** object is the **TDES_BRANCHLIST**.

If only a single **TDES_BRANCH** is run, the owner object = **None**.

If multiple **TDES_BRANCH** running in parallel, the **TDES_BRANCHLIST** object containing the **TDES_BRANCH** is the object.

The **TDES_BRANCH** object has a name (**DESBranch_Name_str**) that is used by the simulation system to identify **TDES_BRANCH**, and a name that can be given by the user and closely related to the operation of a specific system (**DESBranch_Caption_str**).

6.8.2 Defining the TDES_BRANCH Object:

To create an object of type **TDES_BRANCH** in DES Python, do the following:

```
LBranch1 = TDES_BRANCH()
```

where:

LBranch1 The **TDES_BRANCH** object

6.8.3 Attributes of the TDES_BRANCH object:

List of attributes of TDES_BRANCH

```
.class TDES_BRANCH
    self.DESBranch_Owner_class
    self.DESBranch_Name_str
    self.DESBranch_Caption_str
    self.DESBranch_Parent_Name_str
    self.DESBranch_ID_Number
    self.DESBranch_Is_Enabled_bool

    self.DESBranch_Cycle
    self.DESBranch_Cycle_Divider
    self.DESBranch_DESObjectList
    self.DESBranch_Maximal_Length_of_DESObject_Name
    self.DESBranch_DESTaskList
    self.DESBranch_Deleted_DESTask
    self.DESBranch_Deleted_DESTask.DESTask_Owner_class

    self.DESBranch_Simulationtime_Start
    self.DESBranch_Simulationtime_Now
    self.DESBranch_Simulationtime_End
    self.DESBranch_Stop_Simulation_bool

    self.DESBranch_TaskList_Empty_bool

    self.DESBranch_Realtime_Start
    self.DESBranch_Realtime_Actual
    self.DESBranch_Realtime_Change

    self.DESBranch_Model_Name_str
    self.DESBranch_Author_str

    self.ObjectCalculate_Start_Time
    self.ObjectCalculate_Stop_Time
    self.ObjectCalculate_Elapsed_Time

    self.MoveRequest_Start_Time
    self.MoveRequest_Stop_Time
    self.MoveRequest_Elapsed_Time

    self.Process_Start_Time
    self.Process_Stop_Time
    self.Process_Elapsed_Time

    self.DESBranch_RealTime

    self.DESBranch_Number_Of_Entity_Call
    self.DESBranch_Number_Of_Source_Call
    self.DESBranch_Number_Of_Buffer_Call
    self.DESBranch_Number_Of_Machine_Call
    self.DESBranch_Number_Of_Sink_Call
    self.DESBranch_Number_Of_Wrapper_Call
    self.DESBranch_Number_Of_UnWrapper_Call
    self.DESBranch_Number_Of_Path_Call
    self.DESBranch_Number_Of_Lock_Call
    self.DESBranch_Number_Of_UnLock_Call
```

```

self.DESBranch_Summa_DESObject_Call
self.DESBranch_Number_Of_All_Calculation_Cycles
self.DESBranch_Number_Of_Process_Calculation_Cycles
self.DESBranch_Executed_Calculation_Cycles_till_Printing
self.DESBranch_Number_Of_Succesful_Entity_Move_Requests
self.DESBranch_Number_Of_All_Entity_Move_Requests

self.Memo_CSS_Graphics_str
self.Last_Calculation_Time
self.Print_Model_DESConnectionList_bool
self.Print_Model_DESObject_DESChannelsList_bool

self.Print_Model_Start_DESTaskList_bool
self.Result_Files_Name_str

self.Print_EntityList_short_bool
self.Print_EntityList_full_bool

self.Print_ObjectList_short_bool
self.Print_ObjectList_summary_report_bool
self.Print_ObjectList_full_bool

self.Print_Model_DESTaskList_bool

self.Print_Sinked_EntityList_short_bool
self.Print_Sinked_EntityList_bool

self.DESPlot_Enabled_bool
self.DESPlot_Time_Delay_sec
self.DESPlot_Width_in_Characters
self.DESPlot_on_Display_bool
self.DESPlot_Numerical_Values_on_Display_bool
self.DESPlot_Graphical_Values_on_Display_bool
self.DESPlot_Graphical_and_Numerical_Values_on_Display_bool

self.TRACED_bool
self.TRACED_Start_Time
self.TRACED_End_Time
self.TRACED_Print_EntityList_short_bool
self.TRACED_Print_ObjectList_short_bool
self.TRACED_Print_TaskList_short_bool
self.TRACED_Print_MoveRequest_Entity_short_bool
self.TRACED_Time_Delay_sec
self.TRACED_Keyboard_Control_bool
self.TRACED_Lock_UnLock_Control_bool
self.TRACED_Path_Delay_Time_Calculation_bool
self.TRACED_Entity_Hystorical_System_Attribute_bool
self.TRACED_Print_DESObjectList_short_bool
self.TRACED_Print_BUFFERS_DESObjectList_short
self.TRACED_Print_UNIQUE_DESObjects_short_bool
self.TRACED_DES_BRANCH_Name_str
self.TRACED_DES_OBJECT_Name_list
self.Creates_Gantt_diagram_Line_of_DES_OBJECTs_bool

self.LSource
self.LBuffer
self.LMachine
self.LSink
self.LWrapper

```

```
self.LUnWrapper
self.LPath
self.LLock
self.LUnLock

self.DESObject_By_Name_dict
self.DESObject_By_ID_Number_dict
self.DESObject_By_Index_dict
```

```
#####
#####
#####
#####
.class TDES_BRANCH:
    """
    """

#####
#####
# def __str__(self):
#
# Output_str = ''+ f"{self.DESBranch_Name_str}" +' '
#
# return Output_str

#end of def __str__
#-----
#-----
```

```
#####
#####
def __init__(
    self
    DESBranch_Name_str = 'DESBANCH_NAME'
):
    """
```

The procedure defines the initial values of the properties of the object "TDES_BRANCH".

```
#####
The owner object of the TDES_BRANCH object.
Value in case we implement simulation of only one branch = None.
If TDES_BRANCH an element of a TDES_BRANCHLIST, then TDES_BRANCHLIST is an object.
self.DESBranch_Owner_class = None
```

```
Name the TDES_BRANCH object. The name used in the simulation program.
self.DESBranch_Name_str = DESBranch_Name_str
```

```
User naming of TDES_BRANCH object. Profession-specific naming.
The simulation program does not use this attribute!
self.DESBranch_Caption_str = 'CAPTION_OF_BRANCH'
```

```
#####
The name of the parent object of the TDES_BRANCH object.
In the case of a branch running independently, the name of the branch (string).
If the branch is an element (TDES_BRANCHLIST) in a branch list, it is called the
TDES_BRANCHLIST.
self.DESBranch_Parent_Name_str = "NAME_OF_BRANCH'S_PARENT_OBJECT"
```

```
#####
DES_GID_Number.new_value()
```

The ID_Number value of the TDES BRANCH object.

```
self.DESBranch_ID_Number = DES_GID_Number.Value
```


The permission state of the TDES BRANCH object for calculations.

```
self.DESBranch_Is_Enabled_bool = True
```


The current value of the calculation cycles of the TDES_BRANCH object.

```
self.DESBranch_Cycle = 0
```

#####

The divisor value used to output the calculation cycles of the TDES_BRANCH object.
If (DESBranch_Cycle % DESBranch_Cycle_Divider) == 0 are divisible without remainder,
then a result row is written to the screen.

```
self.DESBranch_Cycle_Divider = 5000
```


#DESObjectList

A list of TDES_OBJECT items of the TDES_BRANCH object.

```
self.DESBranch_DESObjectList = [] # list of TDES_OBJECTs
```

#Maximal Length of DESObject_Name_str in DESObjectList

Maximum name length for TDES OBJECT elements of the TDES BRANCH object.

```
self.DESBranch_Maximal_Length_of_DESObject_Name = 0
```


#DESConnectionList

List of TDES_CONNECTION items of the TDES_BRANCH object.

```
#### DESBranch_DESConnectionList
```

```
self.DESBranch_DESConnectionList = [] # list of TDES_CONNECTIONs
```


A list of TDES_TASK objects in the TDES_BRANCH object.

```
self.DESBranch_DESTaskList = [] # list of TDES_TASKs
```

The most recently deleted TDES_TASK object from the TDES_BRANCH object.

```
self.DESBranch_Deleted_DESTask = TDES_TASK()
```

The owner object of the most recently deleted TDES_TASK object from the TDES_BRANCH object.

```
self.DESBranch_Deleted_DESTask.DESTask_Owner_class = self
```

```
#####
```

The initial value of the simulation time of the TDES_BRANCH *with a second dimension*.

```
self.DESBranch_Simulationtime_Start = 0.0 #[secundum]
```

The current(current) value of the simulation time of the TDES_BRANCH with the second dimension.

```
self.DESBranch_Simulationtime_Now = 0.0 #[secundum]
```

The end value of the simulation time of the TDES_BRANCH *with the second dimension*.

```
self.DESBranch_Simulationtime_End = 0.0 #[secundum]
```

When the simulation of the TDES_BRANCH is complete, this Boolean variable is set to True.

```
self.DESBranch_Stop_Simulation_bool = False
```

If (TDES_BRANCH TaslList == 0), then this Boolean variable is set to True.

```
self.DESBranch_TaskList_Empty_bool = False
```

```
#####
```

The initial value for measuring TDES_BRANCH real duration.

```
self.DESBranch_Realtime_Start = 0.0
```

The current value of the measurement of TDES_BRANCH real duration.

```
self.DESBranch_Realtime_Actual = 0.0
```

When measuring TDES_BRANCH real duration, the value of the duration change.

```
self.DESBranch_Realtime_Change = 0.0
```

```
#####
```

Name the current model of the TDES_BRANCH.

```
self.DESBranch_Model_Name_str = 'NAME_OF_MODEL'
```

The name of the programmer (author) of the current model TDES_BRANCH.

```
self.DESBranch_Author_str = 'AUTHOR_OF_MODEL'
```

The time the current model TDES_BRANCH created.

```
self.DESBranch_Date_Of_Creation_str = '2020-10-20'
```

```
#####
```

To calculate different types of objects in the current model of the TDES_BRANCH variables used to calculate real durations used.

Time period values used to calculate TDES_OBJECT.

```
self.ObjectCalculate_Start_Time = 0.0
self.ObjectCalculate_Stop_Time = 0.0
self.ObjectCalculate_Elapsed_Time = 0.0
```

Time values used to move TDES_ENTITY.

```
self.MoveRequest_Start_Time = 0.0
self.MoveRequest_Stop_Time = 0.0
self.MoveRequest_Elapsed_Time = 0.0
```

Time period values used to calculate procedures for TDES_OBJECT.

```
self.Process_Start_Time = 0.0
self.Process_Stop_Time = 0.0
self.Process_Elapsed_Time = 0.0
```

The value of the real duration used to calculate the TDES_BRANCH model.

```
self.DESBranch_RealTime = 0.0
```

#####

TDES_OBJECT procedure call statistics variables.

```
self.DESBranch_Number_Of_Entity_Call = 0

self.DESBranch_Number_Of_Source_Call = 0

self.DESBranch_Number_Of_Buffer_Call = 0

self.DESBranch_Number_Of_Machine_Call = 0

self.DESBranch_Number_Of_Sink_Call = 0

self.DESBranch_Number_Of_Wrapper_Call = 0

self.DESBranch_Number_Of_UnWrapper_Call = 0

self.DESBranch_Number_Of_Path_Call = 0

self.DESBranch_Number_Of_Lock_Call = 0

self.DESBranch_Number_Of_UnLock_Call = 0

self.DESBranch_Summa_DESObject_Call = 0

self.DESBranch_Number_Of_All_Calculation_Cycles = 0

self.DESBranch_Number_Of_Process_Calculation_Cycles = 0

self.DESBranch_Executed_Calculation_Cycles_till_Printing = 0

self.DESBranch_Number_Of_Succesful_Entity_Move_Requests = 0
```



```

self.DESBranch_Number_Of_All_Entity_Move_Requests = 0

#####
Parameters for running CSS continuous system:

The continuous system uses this variable to pass the result of running a CSS simulation
in graphical and numeric format.
self.Memo_CSS_Graphics_str = ''

The time of the last calculated simulation step in a continuous system (CSS)
simulation.
self.Last_Calculation_Time = 0.0

#####
Here we can choose which lists of the model to display.

self.Print_Model_DESObjectList_bool = True

self.Print_Model_DESConnectionList_bool = True

self.Print_Model_DESObject_DESChannelsList_bool = True

self.Print_Model_Start_DESTaskList_bool = True

#####
Here you can choose which lists will appear as results after running a simulation!

self.Result_Files_Name_str = '_Result'

self.Print_EntityList_short_bool = True

self.Print_EntityList_full_bool = False

self.Print_ObjectList_short_bool = True

self.Print_ObjectList_summary_report_bool = True

self.Print_ObjectList_full_bool = False

self.Print_Model_DESTaskList_bool = False

self.Print_Sinked_EntityList_short_bool = True

self.Print_Sinked_EntityList_bool = False

#####
Here you can choose which values to display as results when drawing results! (DRAW)

```

Enable graphical Figure creation.

```
self.DESPlot_Enabled_bool = True
```

The delay in seconds after the graphical display steps.

```
self.DESPlot_Time_Delay_sec = 0.0
```

For graphical display, the width of the drawing. Its value can be either 100 or 200.

```
self.DESPlot_Width_in_Characters = 100# or 200
```

Enable graphical display on the screen.

```
self.DESPlot_on_Display_bool = False
```

Enable the display of numeric data on the screen.

```
self.DESPlot_Numerical_Values_on_Display_bool = False
```

Enable the display of graphic data on the screen.

```
self.DESPlot_Graphical_Values_on_Display_bool = False
```

Enable the display of graphical and numeric data on the screen.

```
self.DESPlot_Graphical_and_Numerical_Values_on_Display_bool = True
```


Here you can choose which lists are displayed on the screen in trace mode.

Enable tracing.

```
self.TRACED_bool = True
```

Trace simulation start time if self.TRACED_bool == True.

```
self.TRACED_Start_Time = 0.0 # [sec]
```

Trace simulation end time if self.TRACED_bool == True.

```
self.TRACED_End_Time = 0.0 # [sec]
```

For tracing, enable short TDES_ENTITY list if self.TRACED_bool == True.

```
self.TRACED_Print_EntityList_short_bool = False
```

For tracing, enable the short TDES_OBJECT list if self.TRACED_bool == True.

```
self.TRACED_Print_ObjectList_short_bool = False
```

Enable short TDES_TASK list for tracing if self.TRACED_bool == True.

```
self.TRACED_Print_TaskList_short_bool = False
```


For tracing, allow short dump to move TDES_ENTITY if self.TRACED_bool == True.
 self.TRACED_Print_MoveRequest_Entity_short_bool = True

Tracing latency in seconds after trace steps if self.TRACED_bool == True.
 self.TRACED_Time_Delay_sec = 1.0# in secundum

Allow program continuation with any key on the keyboard when tracing. TRACED_bool == True.

self.TRACED_Keyboard_Control_bool = False

Enable the current status of Lock and UnLock DESObjects for tracing
 self.TRACED_Lock_UnLock_Control_bool = False

This Boolean variable enables output of calculated parameters for the PATH object.
 self.TRACED_Path_Delay_Time_Calculation_bool = True

Enables historical DESObject entry/exit tracking of Entities, output attributes.
 self.TRACED_Entity_Hystorical_System_Attribute_bool = True

 Here you can choose which TDES_OBJECT parameters are displayed in TRACED mode (during the simulation)!

Enable tracing for TDES_OBJECT (list type).
 self.TRACED_Print_DESObjectList_short_bool = False

self.TRACED_Print_BUFFERS_DESObjectList_short = False

self.TRACED_Print_UNIQUE_DESObjects_short_bool = False

TDES_OBJECT (list) is the name of the TDES_BRANCH.
 self.TRACED_DES_BRANCH_Name_str = ''

TDES_OBJECT (list) tracing is a list created from the names of TDES_OBJECT that are elements of a branch named TRACED_DES_BRANCH_Name_str.
 self.TRACED_DES_OBJECT_Name_list = []

 Allow you to create a Gantt chart row that is created with items in the TDES_OBJECT list.

```

self.Creates_Gantt_diagram_Line_of_DES_OBJECTs_bool = False

#####
Local TDES_OBJECT of the TDES_BRANCH object for calculations.

#LSource
    self.LSource =TDES_OBJECT(TSOURCE
, 'Dummy_Source_Name', 0, 1)
#LBuffer
    self.LBuffer =TDES_OBJECT(TBUFFER, 'Dummy_Buffer_Name', 1, 1)
#LMachine
    self.LMachine =TDES_OBJECT(TMACHINE, 'Dummy_Machine_Name', 1, 1)
#LSink
    self.LSink =TDES_OBJECT(TSINK, 'Dummy_Sink_Name', 1, 0)
#LWrapper
    self.LWrapper =TDES_OBJECT(TWRAPPER, 'Dummy_Wrapper_Name', 4, 1)
#LUnWrapper
    self.LUnWrapper =TDES_OBJECT(TUNWRAPPER, 'Dummy_UnWrapper_Name', 1, 4)
#LPath
    self.LPath =TDES_OBJECT(TPATH, 'Dummy_Path_Name', 1, 1)
#LLock
    self.LLock =TDES_OBJECT(TLOCK, 'Dummy_Lock_Name', 1, 2)
#LUnLock
    self.LUnLock =TDES_OBJECT(TUNLOCK, 'Dummy_UnLock_Name', 2, 1)

#####
Dictionaries of the TDES_BRANCH object.

The TDES_OBJECT list retrieval dictionary by name.
    self.DESObject_By_Name_dict = {}

A ID_Number retrieval dictionary of the TDES_OBJECT list.
    self.DESObject_By_ID_Number_dict = {}

The index retrieval dictionary of the TDES_OBJECT list.
    self.DESObject_By_Index_dict = {}

#end of def __init__
#-----
#-----
#-----
#-----

```

6.8.4 Methods of TDES_BRANCH Object:**List of methods of TDES_BRANCH**

```

def DESBranch_Initiate

def DESBranch_Move_Entity_Request_From_All_InputChannels
def DESBranch_Move_Entity_Request_From_All_OutputChannels
def DESBranch_Message_to_All_OutputChannel_Connected_Objects

def DESBranch_Call_DESObject_Procedure
def DESBranch_Call_DESBranch_Procedure

def DESBranch_DESObject_Name_To_Index
def DESBranch_DESObject_Name_To_ID_Number
def DESBranch_DESObject_Index_To_ID_Number
def DESBranch_DESObject_Index_To_Name
def DESBranch_DESObject_ID_Number_To_Index
def DESBranch_DESObject_ID_Number_To_Name
def DESBranch_DESObject_By_Name
def DESBranch_DESObject_By_Index
def DESBranch_DESObject_By_ID_Number

def DESBranch_Connected_Input_DESObject_Of
def DESBranch_Connected_Output_DESObject_Of
def
DESBranch_FillUp_DESObject_InputChannels_With_Connected_OutputChannels_Inform
ation
def
DESBranch_FillUp_DESObject_OutputChannels_With_Connected_InputChannels_Inform
ation
def
DESBranch_FillUp_DESObject_Channels_With_Connected_Channels_Information
def DESBranch_FillUp_DESObject_Channels_with_System_Name_Information
def
DESBranch_FillUp_DESObjectList_Of_Objects_With_Connected_Channels_Information
def DESBranch_Initiate_DESObjectList
def DESBranch_Is_There_Any_Duplicated_ObjectName_In_DESObjectList
def DESBranch_Insert_DESObject_Into_DESObjectList
def DESBranch_Delete_DESObject_From_DESObjectList
def DESBranch_Delete_DESObject_From_DESObjectList

def DESBranch_Initiate_DESTaskList
def DESBranch_Insert_DES_TASK_Into_DESTaskList_As_LAST
def DESBranch_Insert_DES_TASK_Into_DESTaskList_As_FIRST
def DESBranch_Insert_DES_TASK_Where_Input_Data_Exists
def DESBranch_Insert_DES_TASK_Where_Output_Data_Exists

def DESBranch_Print_DESTaskList
def DESBranch_Insert_First_DES_TASK_Of_SOURCES_Into_DESTaskList
def DESBranch_DELETE_DES_TASK_At_Index
def DESBranch_Delete_DES_TASK_From_DESTaskList

def DESBranch_Print_DES_CONNECTION
def DESBranch_Print_DESConnectionList
def DESBranch_Delete_DES_CONNECTION_From_DESConnectionList
def DESBranch_Is_There_Any_Duplicated_Connection_In_DESConnectionList
def DESBranch_Insert_Connection_Into_DESConnectionList

```

```

def DESBranch_Insert_DES_CONNECTION_Into_DESConnectionList
def DESBranch_Connection_Index_in_DESConnectionList

def DESBranch_Insert_Entity_Into_DESObject_ContentVector
def DESBranch_Get_Only_The_Next_Entity_Of_DESObject_ContentVector

def DESBranch_Print_DES_CHANNEL
def DESBranch_Print_INPUT_OUTPUT_DES_CHANNELS_Of_DESObject
def DESBranch_Print_DES_OBJECT_Short
def DESBranch_Print_DESObjectList_Short
def DESBranch_Print_BUFFERS_DESObjectList_short
def DESBranch_Print_DESObjectList_Summary_Report
def DESBranch_Print_DES_OBJECT
def DESBranch_Print_DESObjectList
def DESBranch_Draw_TBUFFER_Occupancy
def DESBranch_Print_TBUFFERs_Occupancy
def DESBranch_Print_DES_TASK
def DESBranch_DES_Print_ContentVector
def DESBranch_Delete_Task_from_DESBranch_TaskList
def DESBranch_Erase_Connection_from_DESBranch_ConnectionList
def DESBranch_Erase_DESObject_from_DESObjectList
def DESBranch_Print_INPUT_OUTPUT_DES_CHANNELS_Of_All_DESObjects

def DESBranch_Calculate_Last_Calculation_Time_of_All_DESObjects
def DESBranch_Calculate_Next_State_Of_ENTITY
def DESBranch_Calculate_Of_DESObject_Next_State
def DESBranch_Calculate_Next_State_Of_SOURCE
def DESBranch_Calculate_Next_State_Of_BUFFER
def DESBranch_Calculate_Next_State_Of_PATH
def DESBranch_Calculate_Next_State_Of_MACHINE
def DESBranch_Calculate_Next_State_Of_LOCK
def DESBranch_Calculate_Next_State_Of_UNLOCK
def DESBranch_Calculate_Next_State_Of_SINK
def DESBranch_Calculate_Next_State_Of_WRAPPER
def DESBranch_Calculate_Next_State_Of_UNWRAPPER
def DESBranch_Calculate_Next_DESTask

def DESBranch_TENTITY_Move_Request
def DESBranch_Flush_of_DESObject_Time_In_States_of_All_DESObject
def DESBranch_Load_Model_From_File

def DESBranch_ON_AFTER_ENTITY_ENTERED_into_InputChannel_of_DESObject
def DESBranch_ON_AFTER_ENTITY_ENTERED_into_DESObject
def DESBranch_ON_BEFORE_ENTITY_EXITED_from_DESObject
def DESBranch_ON_BEFORE_ENTITY_EXITED_from_OutputChannel_of_DESObject
def DESBranch_ON_ENTITY_SELF_MANAGED_OutputChannel_Index_Setting
def DESBranch_ON_EXTERNAL_DISTRIBUTION_of_DESObject
def
DESBBranch_ON_EXTERNAL_ENTITY_SETTING_at_SELF_MANAGED_operation_to_SOUR
CE_DESObject (
def DESBranch_ON_STATISTICAL_CALCULATION_in_time_of_Simulation
def DESBranch_ON_STATISTICAL_CALCULATION_after_Simulation
def DESBranch_ON_SIMULATION_TIME_RUNNING_FUNCTIONS
def DESBranch_Creates_Gantt_diagram_Line_of_DES_OBJECTs
def DESBranch_Print_DES_Element_by_ID_Number
def DESBranch_Str_of_Model_DESObjects_Actual_Parameters

def DESBranch_Initiate_DESPlot_FloatValues_Vector
def DESBranch_DESPrint_FloatValues_Vector_BEFORE_SIMULATION

```

```
def DESBRanch_DESPrint_FloatValues_Vector_AFTER_SIMULATION
def DESBRanch_DESPrint_FloatValues_Vector_Minimum_Time_Step
def DESBRanch_DESPlot_FloatValues_Vector_Update
def DESBRanch_DESPlot_FloatValues_Vector_Numeric
def DESBRanch_DESPlot_FloatValues_Vector
```


Methods of TDES_BRANCH Object:

```
#####
#####
def DESBranch_Initiate(
    self

    # Python Output:
    # return None
    ):
    """
    Sets the variables that count calls DESObjects to zero
    The procedure replenishes the self.DESBranch_DESTaskList with the Entities generated
    when TSOURCE objects are first run.
    Uploads your self.DESBranch_DESConnectList elements for each DESO channel.
    Initializes TPATH objects and populates their TMACHINE object for TPATH DESObject with
    the delay duration, and sets the index selection strategy
    ("TSelection_by_TIdle_State_Of_Connected_DESObject") for the output channels of the
    TPATH TBUFFER-in object.
    """

#.....
# Python program elements
#.....

#end of def DESBranch_Initiate_DESBranchLists
#-----

#####
#####
def DESBranch_Move_Entity_Request_From_All_InputChannels(
    self
    DESObject, #TDES_OBJECT

    # Python Outputs:
    # return None
    ):
    """
    The procedure sends an Entity Pass Message (ENTITY_Move_Request) to all input channels
    of DESObject specified as parameters.
    if it is empty (None),
    linked to another TDES_CHANNEL,
    TDES_CHANNEL is allowed (you can go through it TDES_ENTITY).
    """

#.....
# Python program elements
#.....

#end of def DESBranch_Move_Entity_Request_From_All_InputChannels
#-----

#####
#####
def DESBranch_Move_Entity_Request_From_All_OutputChannels(
    self
```

```

        DESObject, #TDES_OBJECT

    # Python Outputs:
    # return None
    ):
    """
The procedure sends an Entity Pass Message (TENTITY_Move_Request) to all output
channels of DESObject specified as parameters.
if it is NOT empty (not None)
linked to another TDES_CHANNEL,
TDES_CHANNEL is allowed (you can go through it TDES_ENTITY).
    """

#.....
# Python program elements
#.....

#end of def DESBranch_Move_Entity_Request_From_All_OutputChannels
#-----

#####
#####
def DESBranch_Message_to_All_OutputChannel_Connected_Objects(
    self
    DESObject, #TDES_OBJECT

    # Python Outputs:
    # return None
    ):
    """
The procedure sends an Entity Pass Message (Move_Entity_Request) to the DES object
associated with all output channels of DESObject specified as parameters.
if the channel's Data_class attribute is NOT empty (not None)
if the channel is connected to another TDES_CHANNEL,
TDES_CHANNEL is allowed (you can go through it TDES_ENTITY).
    """

#.....
# Python program elements
#.....

#end of def DESBranch_Message_to_All_OutputChannel_Connected_Objects
#-----

#####
#####
def DESBranch_Call_DESObject_Procedure(
    self
    DESObject_Sender_Name_str,
    Object_Function_Number,

    Function_Parameter1_num,
    Function_Parameter2_str,
    Function_Parameter3_str,

    # Python Variable:
    # return [Sender_Object, #TDES_OBJECT

```

```

        # Sender_Index,
        # Read_DES_Object_Is_OK_bool]
    ):
        """
The procedure runs the procedure with the sequence number specified by
Object_Function_Number from among the procedures that can be assigned to the DESObject
parameter.
Input parameters can be used to define arbitrary (custom) output parameter value(s).
        """

#.....
# Python program elements
#.....

#end of def DESBranch_Call_DESObject_Procedure
#-----

#####
#####
# Calls a procedure in DES_BRANCH (to reach all elements of DES_BRANCH)
def DESBBranch_Call_DESBBranch_Procedure(
    self
    Branch_Function_Number,

    Function_Parameter1_str = '',
    Function_Parameter1_num = 0,

    Function_Parameter2_str = '',
    Function_Parameter2_num = 0,

    Function_Parameter3_str = '',
    Function_Parameter3_num = 0,

    Function_Parameter4_str = '',
    Function_Parameter4_num = 0,

    # Python Variable:
    # return None
):
    """
The procedure runs the procedure with the sequence number specified by
Branch_Function_Number from the procedures that can be assigned to DESBranch as
parameters.
Input parameters can be used to define arbitrary (custom) output parameter value(s).
    """

#.....
# Python program elements
#.....

#end of def DESBranch_Call_DESBBranch_Procedure
#-----

#####
#####
#Conversion routines
def DESBBranch_DESObject_Name_To_Index(
    self
    Object_Name_str,

```

```

    # Python Output:
    # return [DESObject,#TDES_OBJECT
    # Index, # of DESObject in self.DESBranch_DEDObjectList
    # Index_Is_OK_bool]
    ):
    """
    The procedure uses the name of DESObject as a parameter to determine its index in
    self.DESBranch_DESObjectList.
    """

#.....
# Python program elements
#.....

#end of DESBranch_DESObject_Name_To_Index
#-----

#####
#####
#Conversion routines
def DESBranch_DESObject_Name_To_ID_Number(
    self
    Object_Name_str,

    # Python Output:
    # return [DESObject,#TDES_OBJECT
    # ID_Number, # of DESObject in self.DESBranch_DEDObjectList
    # Index, # of DESObject in self.DESBranch_DEDObjectList
    # ID_Number_Is_OK_bool]
    ):
    """
    The procedure uses the name of DESObject as a parameter to determine the value of
    ID_Number in self.DESBranch_DESObjectList.
    """

#.....
# Python program elements
#.....

#end of def DESBranch_DESObject_Name_To_ID_Number
#-----

#####
#####
#Conversion routines
def DESBranch_DESObject_Index_To_ID_Number(
    self
    Index

    # Python Output:
    # return [DESObject,#TDES_OBJECT
    # ID_Number, # of DESObject in self.DESBranch_DEDObjectList
    # ID_Number_Is_OK_bool]
    ):
    """

```

The procedure uses the index of DESObject as a parameter to determine the value of ID_Number in self.DESBranch_DESObjectList.

"""

#.....
Python program elements
#.....

#end of def DESBranch_DESObject_Index_To_ID_Number

#-----

#Conversion routines

```
def DESBranch_DESObject_Index_To_Name(
    self
    Index
```

```
    # Python Output:
    # return [DESObject,#TDES_OBJECT
    # Name_str, # of DESObject in self.DESBranch_DESObjectList
    # ID_Number, # of DESObject in self.DESBranch_DESObjectList
    # Name_Is_OK_bool]
    ):
    """
```

The procedure uses the index of DESObject as a parameter to determine the name of self.DESBranch_DESObjectList.

"""

#.....
Python program elements
#.....

#end of def DESBranch_DESObject_Index_To_Name

#-----

#Conversion routines

```
def DESBranch_DESObject_ID_Number_To_Index(
    self
    ID_Number,
```

```
    # Python Output:
    # return [DESObject,#TDES_OBJECT
    # Index, # of DESObject in self.DESBranch_DESObjectList
    # Index_Is_OK_bool]
    ):
    """
```

The procedure uses the DESObject parameter ID_Number value to determine its index in self.DESBranch_DESObjectList.

"""

#.....
Python program elements
#.....

#end of def DESBranch_DESObject_ID_Number_To_Index

#-----

```
#####
#####
#Conversion routines
```

```
def DESBranch_DESObject_ID_Number_To_Name(
    self
    ID_Number,

    # Python Output:
    # return [DESObject,#TDES_OBJECT
    # Name_str, # of DESObject in self.DESBranch_DEDObjectList
    # Index, # of DESObject in self.DESBranch_DEDObjectList
    # Name_Is_OK_bool]
    ):
    """
```

The procedure uses the DESObject ID_Number value provided as a parameter to determine the name of self.DESBranch_DESObjectList.

```
    """
```

```
#.....
# Python program elements
#.....
```

```
#end of def DESBranch_DESObject_ID_Number_To_Name
```

```
#-----
```

```
#####
#####
#Conversion routines
```

```
def DESBranch_DESObject_By_Name(
    self
    Name_str,

    # Python Output:
    # return [DESObject,#TDES_OBJECT
    # ObjectIndex, # of DESObject in self.DESBranch_DEDObjectList
    # Object_Is_OK_bool]
    ):
    """
```

The procedure reads DESObject and its index from self based on the name of DESObject provided as a parameter. DESBranch_DESObjectList.

```
    """
```

```
#.....
# Python program elements
#.....
```

```
#end of def DESBranch_DESObject_By_Name
```

```
#-----
```

```
#####
#####
#Conversion routines
```

```
def DESBranch_DESObject_By_Index(
    self
```

```

        Index

    # Python Output:
    # return [DESObject,#TDES_OBJECT
    # Object_Is_OK_bool]
    ):
    """
    The procedure reads DESObject from self based on the name of DESObject parameter.
    DESBranch_DESObjectList.
    """

#.....
# Python program elements
#.....

#end of def DESBranch_DESObject_By_Index
#-----

#####
#####
#Conversion routines
def DESBBranch_DESObject_By_ID_Number(
    self
    ID_Number,

    # Python Output:
    # return [DESObject,#TDES_OBJECT
    # ObjectIndex, # of DESObject in self.DESBranch_DESObjectList
    # Object_Is_OK_bool]
    ):
    """
    Based on the value of the DESObject ID_Number parameter, the procedure reads DESObject
    and its index from self.DESBranch_DESObjectList.
    """

#.....
# Python program elements
#.....

#end of def DESBranch_DESObject_By_ID_Number
#-----

#####
#####
#Conversion routines
def DESBBranch_Connected_Input_DESObject_Of(
    self
    DES_ObjectNameOUT_str, # Output Channel of DES_Object_OUT
    DES_Channel_IndexOUT,

    # Python Output:
    # return [DES_ObjectNameIN_str,
    # DES_Channel_IndexIN,
    #DES_ObjectNameIN_OK_bool
    ):
    """

```

For the input parameters provided, the procedure determines which input channel of which DESObject is connected to another DESObject.

```

"""
#.....
# Python program elements
#.....

#end of def DESBranch_Connected_Input_DESObject_Of
#-----

```

```

#####
#####
#Conversion routines

```

```

def DESBBranch_Connected_Output_DESObject_Of(
    self
    DES_ObjectNameIN_str, #Output Channel of DES_Object_OUT
    DES_Channel_IndexIN,

    # Python Output:
    # return [DES_ObjectNameOUT_str,
    # DES_Channel_IndexOUT,
    # DES_ObjectNameOUT_OK_bool]
    ):
    """

```

For the input parameters provided, the procedure determines which output channel of which DESObject is connected to another DESObject.

```

"""
#.....
# Python program elements
#.....

#end of def DESBranch_Connected_Output_DESObject_Of
#-----

```

```

#####
#####
def

```

DESBBranch_FillUp_DESObject_InputChannels_With_Connected_OutputChannels_Information(

```

    self
    ID_Number_Of_DESObject, #Channel_INs DES_Object

    # Python Output:
    # return [DESObject,#TDES_OBJECT
    # DESObject_Inputs_Are_OK_bool]
    ):
    """

```

The procedure populates the connection of input channels to output channels with the specified input channel parameters.

```

"""
#.....
# Python program elements
#.....

```



```

#end of def
DESBranch_FillUp_DESObject_InputChannels_With_Connected_OutputChannels_Information
#-----

#####
#####
def
DESBranch_FillUp_DESObject_OutputChannels_With_Connected_InputChannels_Information(
    self
    ID_Number_Of_DESObject, #Channel_OUTs DES_Object

    # Python Output:
    # return [DESObject,#TDES_OBJECT
    # DESObject_Outputs_Are_OK_bool]
    ):
    """
    The procedure populates the connection of output channels to input channels with the
    specified input channel parameters.
    """

    #.....
    # Python program elements
    #.....

#end of def
DESBranch_FillUp_DESObject_OutputChannels_With_Connected_InputChannels_Information
#-----

#####
#####
def
DESBranch_FillUp_DESObject_Channels_With_Connected_Channels_Information(
    self
    ID_Number_Of_DESObject,

    # Python Output:
    # return [DESObject,#TDES_OBJECT
    # DESObject_FillUp_Is_OK_bool]
    ):
    """
    The procedure populates the connection of output channels to input channels and vice
    versa with the specified input channel parameters.
    """

    #.....
    # Python program elements
    #.....

#end of def DESBranch_FillUp_DESObject_Channels_With_Connected_Channels_Information
#-----

#####
#####
def DESBranch_FillUp_DESObject_Channels_with_System_Name_Information(

```

```

        self

    # Python Output:
    # return None
    ):
    """
The procedure populates the input and output channels of DESObjects in TDES_BRANC with
the names of DESBranch and DESObjects, as well as the channel type and index.

Example:
As an input channel:
    'Model11.ER_Osszeallitas_W.DESObject_Inputs[0]'
As output channel:
    'Model11.ER_Osszeallitas_W.DESObject_Outputs[2]'
    """

#.....
# Python program elements
#.....

#end of def DESBranch_FillUp_DESObject_Channels_with_System_Name_Information
#-----

#####
#####
def
DESBranch_FillUp_DESObjectList_Of_Objects_With_Connected_Channels_Information(
    self

    # Python Output:
    # return [DESObject_FillUp_OK_bool]
    ):
    """
The procedure uses the core input channel parameters to populate the connection of the
output channels to the input channels and vice versa.
    """

#.....
# Python program elements
#.....

#end of def
DESBranch_FillUp_DESObjectList_Of_Objects_With_Connected_Channels_Information
#-----

#####
#####
def DESBranch_Initiate_DESObjectList(
    self

    # Python Output:
    # return None
    ):
    """
The procedure deletes the self.DESBranch_DESObjectList content.
    """

#.....
# Python program elements

```

```

#.....

#end of def DESBranch_Initiate_DESObjectList
#-----

#####
#####
def DESBBranch_Is_There_Any_Duplicated_ObjectName_In_DESObjectList(
    self
    DESObject, #TDES_OBJECT,

    # Python Output:
    # return [DES_ObjectName_NotDuplicated_OK_bool]
    ):
    """
    This procedure checks whether a DES object with the same name as the DESObject
    specified as the input parameter already exists in self.DESBranch_DESObjectList.
    """

#.....
# Python program elements
#.....

#end of def DESBranch_Is_There_Any_Duplicated_ObjectName_In_DESObjectList
#-----

#####
#####
def DESBBranch_Insert_DESObject_Into_DESObjectList(
    self
    DESObject, #TDES_OBJECT,

    # Python Output:
    # return [Memo_str,
    # Insert_DESObject_Is_OK_bool]
    ):
    """
    The procedure adds self.DESBranch_DESObjectList DESObject to the end.
    """

#.....
# Python program elements
#.....

#end of def DESBranch_Insert_DESObject_Into_DESObjectList
#-----

#####
#####
# Deletes a DES_OBJECT by ID_Number from DESObjectList
def DESBBranch_Delete_DESObject_From_DESObjectList(
    self
    DESObject_To_Delete, #TDES_OBJECT

    # Python Output:
    # return [Delete_Is_OK_bool]

```

```

        ):
        """
This procedure deletes DESObject_To_Delete DESObject from self.DESBranch_DESObjectList.
        """

#.....
# Python program elements
#.....

#end of def DESBranch_Delete_DESObject_From_DESObjectList
#-----

#####
#####
def DESBBranch_Initiate_DESTaskList(
    self

    # Python Output:
    # return None
    ):
    """
The procedure deletes the self.DESBranch_DESTaskList content.
    """

#.....
# Python program elements
#.....

#end of def DESBranch_Initiate_DESTaskList
#-----

#####
#####
def DESBBranch_Insert_DES_TASK_Into_DESTaskList_As_LAST(
    self
    Task_To_Insert, #TDES_TASK

    # Python Output:
    # return None
    ):
    """
The procedure inserts a TDES_TASK into the self.DESBranch_DESTaskList, based on the
DESTask_Time_Of_Task attribute.
Insert the new DES_TASK as the last item of DESTask_Time_Of_Task with the same point in
time.
    """

#.....
# Python program elements
#.....

#end of def DESBranch_Insert_DES_TASK_Into_DESTaskList_As_LAST
#-----

#####
#####

```

```
def DESBranch_Insert_DES_TASK_Into_DESTaskList_As_FIRST(
    self
    Task_To_Insert, #TDES_TASK

    # Python Output:
    # return None
    ):
    """
    The procedure inserts a TDES_TASK into the self.DESBranch_DESTaskList based on the
    DESTask_Time_Of_Task attribute.
    Insert the new DES_TASK as the very first item of DESTask_Time_Of_Task with the same
    point in time.
    """

    #.....
    # Python program elements
    #.....

    #end of def DESBranch_Insert_DESTask_Into_DESTaskList_As_FIRST
    #-----
```

```
#####
#####
def DESBranch_Insert_DES_TASK_Where_Input_Data_Exists(
    self

    # Python Output:
    # return None
    ):
    """
    The procedure inserts a (new) status update TDES_TASK into the
    self.DESBranch_DESTaskList if the input feed of DESObject includes an entity ID_Number.
    The procedure is performed by the self.DESBranch_DESObjectList runs it on all items
    except objects of type TSOURCE.
    """

    #.....
    # Python program elements
    #.....

#end of def DESBranch_Insert_Task_Where_Input_Data_Exists
#-----

#####
#####
def DESBranch_Insert_DES_TASK_Where_Output_Data_Exists(
    self

    # Python Output:
    # return None
    ):
    """
    The procedure inserts a (new) state update TDES_TASK into the
    self.DESBranch_DESTaskList, where data for an entity ID_Number is included.
    The procedure is performed by the self.DESBranch_DESObjectList runs it on all items
    except TSINK objects.
    """

    #.....
    # Python program elements
    #.....

#end of def DESBranch_Insert_Task_Where_Output_Data_Exists
#-----
```

```
#####
#####
#Prints DES_Task List
def DESBranch_Print_DESTaskList(
    self

    # Python Output:
    # return [Memo_str]
    ):
    """
    The procedure prints all TDES_TASK that are in the self.It is listed in
    DESBranch_DESTaskList.
    """

#.....
# Python program elements
#.....

#end of def DESBranch_Print_DESTaskList
#-----

#####
#####
def DESBranch_Insert_First_DES_TASK_Of_SOURCES_Into_DESTaskList(
    self

    # Python Output:
    # return [Memo_str]
    ):
    """
    The procedure appends (appends) the first TDES_TASK(s) to the
    self.DESBranch_DESTaskList, defined from the parameters of the SOURCE DESObject(s).
    """

#.....
# Python program elements
#.....

#end of def DESBranch_Insert_First_DESTask_Of_SOURCES_Into_DESTaskList
#-----

#####
#####
def DESBranch_DES_TASK_At_Index(
    self
    Task_Index,

    # Python Output:
    # return [Task]
    ):
    """
    The procedure reads the Task at the specified Task_Index value from
    self.DESBranch_DESTaskList.
    """

#.....
# Python program elements
#.....
```

```

#end of def DESBranch_DESTask_At_Index
#-----

#####
#####
def DESBranch_Delete_DES_TASK_From_DESTaskList(
    self
    Task_To_Delete,

    # Python Output:
    # return [Delete_Is_OK_bool]
    ):
    """
    The procedure erases the Task_To_Delete TDES_TASK from the self.DESBranch_DESTaskList.
    """

#.....
# Python program elements
#.....

#end of def DESBranch_Delete_DESTask_From_DESTaskList
#-----

#####
#####
#Print DES_CONNECTION
def DESBranch_Print_DES_CONNECTION(
    self
    Connection, #TDES_CONNECTION

    # Python Output:
    # return [Memo_str]
    ):
    """
    This procedure prints all properties of an TDES_CONNECTION object.
    """

#.....
# Python program elements
#.....

#end of def DESBranch_Print_DES_CONNECTION
#-----

#####
#####
#Print DES_DES_ConnectionList
#Figyelembe note that the OUT and IN elements may be in different BRANCHES.
#A CONNECTION belongs to the DES_BRANCH from which it starts (in which the OUT object
is included)
def DESBranch_Print_DESConnectionList(
    self

    # Python Output:
    # return [Memo_str]
    ):

```



```

        """
The procedure prints all TDES_CONNECTION on the self.DESBranch_DESConnectionList.
        """

```

```

#.....
# Python program elements
#.....

```

```

#end of def DESBranch_Print_DESConnectionList
#-----

```

```

#####
#####

```

```

def DESBranch_Delete_DES_CONNECTION_From_DESConnectionList(
    self
    Connection_To_Delete, #TDES_CONNECTION

```

```

    # Python Output:
    # return [Delete_Is_OK_bool]
    ):
    """

```

```

The procedure deletes the Connection_To_Delete TDES_CONNECTION from the
self.DESBranch_DESConnectionList.
        """

```

```

#.....
# Python program elements
#.....

```

```

#end of def DESBranch_Delete_Connection_From_DESConnectionList
#-----

```

```

#####
#####

```

```

def DESBranch_Is_There_Any_Duplicated_Connection_In_DESConnectionList(
    self
    New_Connection, #TDES_CONNECTION

```

```

    # Python Output:
    #return [Channel_OUT_Index_OK_bool, #=0
    # Channel_OUT_NotDuplicated_OK_bool, #=1
    # Channel_IN_Index_OK_bool, #=2
    # Channel_IN_NotDuplicated_OK_bool, #=3
    # New_Connection_Not_Duplicated_OK_bool] #=4
    ):
    """

```

```

The procedure examines whether the self.DESBranch_DESConnectionList has an object with
an TDES_CONNECTION that is exactly the same as the properties of the New_Connection.
        """

```

```

#.....
# Python program elements
#.....

```

```

#end of def DESBranch_Is_There_Any_Duplicated_Connection_In_DESConnectionList
#-----

```

```
#####
#####
def DESBranch_Insert_Connection_Into_DESConnectionList(
    self
    Connection, #TDES_CONNECTION

    # Python Output:
    # return [Memo_str,
    # Connection_Inserted_OK_bool]
    ):
    """
    The procedure appends the Connection TDES_CONNECTION object to
    self.DESBranch_DESConnectionList.
    """

#.....
# Python program elements
#.....

#end of def DESBranch_Insert_Connection_Into_DESConnectionList
#-----

#####
#####
def DESBranch_Insert_DES_CONNECTION_Into_DESConnectionList(
    self
    Connection, #TDES_CONNECTION

    # Python Output:
    # return [Memo_str,
    # Connection_Inserted_OK_bool]
    ):
    """
    The procedure appends the Connection TDES_CONNECTION object to
    self.DESBranch_DESConnectionList.
    """

#.....
# Python program elements
#.....

#end of def DESBranch_Insert_Connection_Into_DESConnectionList
#-----
```

```
#####
#####
```

```
def DESBranch_Connection_Index_in_DESConnectionList(
    self
    Connection, #TDES_CONNECTION
```

```
    # Python Output:
    # return [Connection_Index,
    # Connection_Index_Is_OK_bool]
    ):
    """
```

```
The procedure finds the Connection TDES_CONNECTION object in
self.DESBranch_DESConnectionList.
If you can't find the Connection object, then the output index is equal to -1.
    """
```

```
#.....
# Python program elements
#.....
```

```
#end of def DESBranch_Connection_Index_in_DESConnectionList
#-----
```

```
#####
#####
```

```
def DESBranch_Insert_Entity_Into_DESObject_ContentVector(
    self
    DESObject_Name_str, # Name of DESObject (Container)
    Entity_to_insert, #TDES_ENTITY
```

```
    # Python Output:
    # return [DESObject, #TDES_OBJECT
    # Insert_Is_OK_bool]
    ):
    """
```

```
The procedure appends a ID_Number to the internal Entity Storage vector of DESObject
self.DESObject_Content_Entities_Vector.
    """
```

```
#.....
# Python program elements
#.....
```

```
#end of def DESBranch_Insert_ID_Number_Into_DESObject_ContentVector
#-----
```

```
#####
#####
def DESBranch_Get_Only_The_Next_Entity_Of_DESObject_ContentVector(
    self
    DESObject, #TDES_OBJECT#DESObject_ContentVector
    Queue_Type, #TDES_Queue_Type,
    #DESBranch_Get_And_Erase_The_Next_EntityID_Number_Of_DESObject_ContentVector
    Erase_Entity_bool, #If (Erase_Entity_bool == True) REMOVES the Entity

    # Python Output:
    # return [Entity_ID_Number,
    # Entity_ID_Number_Is_OK_bool]
    ):
    """
The procedure determines which entity is next (to be processed) in BUFFER DESObject
based on the selection strategy.
If the logical variable "Erase_Entity_bool" is set to "False", only the selection is
performed, and if the value of the variable is "True", it also deletes the Entity from
the internal storage vector of the BUFFER object.
    """

#.....
# Python program elements
#.....

#end of def DESBranch_Get_Only_The_Next_EntityID_Number_Of_DESObject_ContentVector
#-----

#####
#####
#Print DES_CHANNEL
def DESBranch_Print_DES_CHANNEL(
    self
    Channel, #TDES_CHANNEL

    # Python Output:
    # return [Memo_str]
    ):
    """
The procedure prints all properties of the Channel TDES_CHANNEL object.
    """

#.....
# Python program elements
#.....

#end of def DESBranch_Print_DES_CHANNEL
#-----

#####
#####
#Print DES_CHANNEL
def DESBranch_Print_INPUT_OUTPUT_DES_CHANNELS_Of_DESObject(
    self
    DESObject, #TDES_OBJECT

    # Python Output:
    # return [Memo_str]
    ):
```

```

        ):
        """
The procedure prints the properties of all DESObject input and output TDES_CHANNEL
objects.
        """

#.....
# Python program elements
#.....

#end of def DESBranch_Print_INPUT_OUTPUT_DES_CHANNELS_Of_DESObject
#-----

#####
#####
#Print DES_OBJECT_Short
def DESBranch_Print_DES_OBJECT_Short(
    self
    Object_Prefix_str, # Example: " = Branch_Name_str + '.'
    DESObject_Name_str,
    Name_Field_maximum, # Maximal Length of Name_Field

    # Python Output:
    # return [Memo_str]
    ):
    """
The procedure prints out the most important properties of a TDES_OBJECT.
    """

#.....
# Python program elements
#.....

#end of def DESBranch_Print_DES_OBJECT_Short
#-----

#####
#####
#Print DES_OBJECTLIST_Short
def DESBranch_Print_DESObjectList_Short(
    self

    # Python Output:
    # return [Memo_str]
    ):
    """
The procedure prints the self.The most important features of DESObjects included in
DESBranh_DESObjectList.
    """

#.....
# Python program elements
#.....

#end of def DESBranch_Print_DESObjectList_Short
#-----

```

```
#####
#####
#Print DES_OBJECTLIST_Short
def DESBranch_Print_BUFFERS_DESObjectList_short(
    self

    # Python Output:
    # return [Memo_str]
    ):
    """
    The procedure prints the self.Key features of TBUFFER DESObjects included in
    DESBranch_DESObjectList.
    """

#.....
# Python program elements
#.....

#end of def DESBranch_Print_BUFFERS_DESObjectList_short
#-----

#####
#####
#Print DES_OBJECTLIST_Short
def DESBranch_Print_UNIQUE_DESObjects_short(
    self
    TRACED_DES_OBJECT_Name_list

    # Python Output:
    # return [Memo_str]
    ):
    """
    The procedure prints the self.DESBranch_DESObjectList key properties of selected
    (TRACED_DES_OBJECT_Name_list) DES objects.
    """

#.....
# Python program elements
#.....

#end of def DESBranch_Print_UNIQUE_DESObjects_short_bool
#-----

#####
#####
#Print DES_OBJECTLIST_Summary_Report
def DESBranch_Print_DESObjectList_Summary_Report(
    self

    # Python Output:
    # return [Memo_str]
    ):
    """
    The procedure prints the self.Statistical data of DESObjects in DESBranch_DESObjectList
    as determined during simulation.
    """

#.....
```

```

# Python program elements
#.....

#end of def DESBranch_Print_DESObjectList_Summary_Report
#-----

#####
#####
#Print DES_OBJECT
def DESBranch_Print_DES_OBJECT(
    self
    DESObject_Name_str,

    # Python Output:
    # return [Memo_str]
    ):
    """
    The procedure prints all the properties of a TDES_OBJECT.
    """

#.....
# Python program elements
#.....

#end of def DESBranch_Print_DES_OBJECT
#-----

#####
#####
#Print DES_OBJECTLIST
def DESBranch_Print_DESObjectList(
    self

    # Python Output:
    # return [Memo_str]
    ):
    """
    The procedure prints the self.DESBranch_DESObjectList all properties of all your
    DESObjects.
    """

#.....
# Python program elements
#.....

#end of def DESBranch_Print_DESObjectList
#-----

#####
#####
#Draw TBUFFER Occupancy
def DESBranch_Draw_TBUFFER_Occupancy(
    self
    DESObject_Name_str,

```

```

        # Python Output:
        # return [Memo_str]
        ):
        """
The procedure prints the percentage (occupitication) of the TBUFFER object named
DESObject_Name_str for each index of content (Content_Vector) numerically and
graphically.
        """

#.....
# Python program elements
#.....

#end of def DESBranch_Draw_TBUFFER_Occupancy
#-----

#####
#####
#Print TBUFFER Occupancy
def DESBbranch_Print_TBUFFERS_Occupancy(
    self

    # Python Output:
    # return [Memo_str]
    ):
    """
The procedure prints the percentage occupancy of all TBUFFER objects in the
DESBbranch_DESObjectList for each index of the content (Content_Vector).
    """

#.....
# Python program elements
#.....

#end of def DESBranch_Print_TBUFFERS_Occupancy
#-----

#####
#####
# Prints a DES_TASK attributes
def DESBbranch_Print_DES_TASK(
    self
    Task, #TDES_TASK

    # Python Output:
    # return [Memo_str]
    ):
    """
The procedure prints out all the properties of a TDES_TASK.
    """

#.....
# Python program elements
#.....

#end of def DESBranch_Print_DES_TASK
#-----

```



```
#####
#####
def DESBranch_DES_Print_ContentVector(
    self
    ContentVector, #TDES_ENTITY

    # Python Output:
    # return [Memo_str]
    ):
    """
    The procedure prints the contents of a ContentVector (its ID_Number values).
    """

    #.....
    # Python program elements
    #.....

#end of def DES_Print_ContentVector
#-----

#####
#####
# Original -> DESEntityList.erase(it_task)

def DESBranch_Delete_Task_from_DESBranch_TaskList(
    self
    Task_Index,

    # Python Output:
    # return [self.DESBranch_DESTaskList, #TDES_TaskList
    #Deleted_Task, #TDES_TASK
    # TaskDelete_Operation_OK_bool]
    ):
    """
    The procedure deletes a TDES_TASK from the self.DESBranch_TaskList.
    """

    #.....
    # Python program elements
    #.....

#end of def DESBranch_Erase_Task_from_DESBranch_TaskList
#-----

#####
#####
# DESConnectionList.erase(it_connection)

def DESBranch_Erase_Connection_from_DESBranch_ConnectionList(
    self
    Connection_Index,

    # Python Output:
    # return [self.DESBranch_DESConnectionList, #TDES_ConnectionVector
    #Deleted_Connection, #TDES_CONNECTION
    # ConnectionDelete_Operation_OK_bool]
```

```

        ):
        """
The procedure deletes a TDES_CONNECTION from the self.DESBranch_ConnectionList.
        """

#.....
# Python program elements
#.....

#end of def DESBranch_Erase_Connection_from_DESBranch_ConnectionList
#-----

#####
#####
#####
# DESObjectList.erase(it_connection)

def DESBranch_Erase_DESObject_from_DESObjectList(
    self
    DESObject_ID_Number,

    # Python Output:
    # return [self.DESBranch_DESObjectList,
    # Deleted_DESObject, #TDES_OBJECT
    # DESObjectDelete_Operation_OK_bool]
    ):
    """
The procedure deletes a TDES_OBJECT from the self.DESBranch_DESObjectList.
    """

#.....
# Python program elements
#.....

#end of def DESBranch_Erase_DESObject_from_DESObjectList
#-----

#####
#####
def DESBranch_Print_INPUT_OUTPUT_DES_CHANNELS_Of_All_DESObjects(
    self

    # Python Output:
    # return [Memo_str]
    ):
    """
The procedure prints all TDES_OBJECT INPUT_OUTPUT_CHANNEL properties of the
self.DESBranch_DESObjectList.
    """

#.....
# Python program elements
#.....

#end of def DESBranch_Print_INPUT_OUTPUT_DES_CHANNELS_Of_All_DESObjects
#-----

```

```
#####
#####
def DESBranch_Calculate_Last_Calculation_Time_of_All_DESObjects(
    self

    # Python Output:
    # return [Last_Calculation_Time]
    ):
    """
    The procedure determines the last update time (Last_Calculation_Time) for all
    DESObjects.
    """

    #.....
    # Python program elements
    #.....

#end of def DESBranch_Calculate_Last_Calculation_Time_of_All_DESObjects
#-----
```

```
#####
#####
def DESBranch_Calculate_Next_State_Of_ENTITY(
    self
    Entity, #TDES_ENTITY

    # Python Output:
    # return [Memo_str,
    # Entity # TDES_ENTITY
    #       ]
    ):
    """
    The procedure determines the next state of the TDES_ENTITY.
    """

    #.....
    # Python program elements
    #.....

#end of def DESBranch_Calculate_Next_State_Of_ENTITY
#-----
```

```
#####
#####
def DESBranch_Calculate_Of_DESObject_Next_State(
    self
    DES_Object #TDES_OBJECT

    # Python Output:
    # return None
    ):
    """
    This procedure determines the next state of the specified DES object (TDES_OBJECT).
    """
```

```

#.....
# Python program elements
#.....

#end of def DESBranch_Calculate_Of_DESObject_Next_State
#-----

#####
#####
#####
#####
def DESBranch_Calculate_Next_State_Of_SOURCE(
    self
    LSource, #TDES_OBJECT

    # Python Output:
    # return [Memo_str,
    # LSource,
    # TRACE_log_str]
    ):
    """
    The procedure determines the next state of LSource TDES_OBJECT.

    The LSource object emits an Entity object with the time specified by its
    SOURCE_Time_Step parameter, which is submitted to the simulation system for
    LSource.DESObject_Capacity = 1.

    If LSource.DESObject_Capacity > 1 and integer, LSource DESObject emits as many Entities
    as Capacity at the Entity issuance date.

    If LSource DESObject has not run out of Entities by the next Entittas issuance date,
    create only enough Entities so that the sum of the count of Entities in LSource
    DESObject_Content_Entities_Vector and the count of newly created Entities equals the
    value of Capacity. In other words, it only creates enough Entities so that there is
    always a Capacity number of Entities at the time the Entities are issued.

    The LSource object provides the CSS system running in parallel with the ability to
    update the CSS system objects at a given simulation time.
    """

#.....
# Python program elements
#.....

# end of def DESBranch_Calculate_Next_State_Of_SOURCE
# -----

#####
#####
#####
#####
def DESBranch_Calculate_Next_State_Of_BUFFER(
    self
    LBuffer # TDES_OBJECT

    # Python Output:
    # return [Memo_str,
    # LBuffer,
    # TRACE_log_str]
    ):
    """

```

The procedure determines the next state of the LBuffer TDES_OBJECT.

The LBuffer object implements staging storage of entity objects received at its input if they cannot continue in the simulation system due to the occupying of the object linked to the output.

The DESObject_Capacity parameter of the LBuffer object contains the maximum number of Entities that can be stored in the object.

```
"""
#.....
# Python program elements
#.....

# end of def DESBranch_Calculate_Next_State_Of_BUFFER
# -----
```

```
#####
#####
#####
#####
def DESBranch_Calculate_Next_State_Of_PATH(
    self
    LPath # TDES_OBJECT

    # Python Output:
    # return [Memo_str,
    # LPath,
    # TRACE_log_str]
    ):
    """
```

The procedure determines the following state of LPath TDES_OBJECT.

```
#####
# TPATH
#####

# PATH DESObject internal DESObject names:
# =====
Path controllal
    LPath.DESObject_Name_str + "_Path_Control_Buffer"
    LPath.DESObject_Name_str + "_Path_Machine"

Without path control
    LPath.DESObject_Name_str + "_Path_Buffer"
    LPath.DESObject_Name_str + "_Path_Machine"
```

The Path object staging storage of entity objects received at its input Implements.

The "DESObject_Capacity" parameter of the Path object contains in the object Maximum number of entities that can be stored.

```
# Queue type of Path object
self.PATH_Type_Of_Queue = \
    TEnumTuple(
        TDES_Queue_Type_tuple,
        'TQueue_First_In_First_Out'
    ) #Input variable
```

"self.PATH_Number_of_Tracks" is the number of segments on the path (TPATH).

```

# This is the number of Entities that the route can receive, after which no more
Entities will be allowed to enter.
for example:
    self.PATH_Number_of_Tracks = 6

# The "self.PATH_Maximum_Used_Tracks" attribute value is determined by the program
# for the duration of the simulation. This attribute shows whether the available
Maximum number of # segments were used during the simulation.
    self.PATH_Maximum_Used_Tracks = 0
#By program calculated variable

# Start position of Path
    self.PATH_Start_Position = TDESObject_Position()
#Input variable
# End position of Path
    self.PATH_End_Position = TDESObject_Position() #Input variable

# Length of Path
    self.PATH_Length = 0.0 # [m] #By program calculated variable

# Acceleraion value on TPATH
    self.PATH_Acceleration = 1.0 # [m/s^2]
# Constant Speed value on TPATH
    self.PATH_Constant_Velocity = 1.0 # [m/s]
# Retardation value on TPATH
    self.PATH_Retardation = -1.0 # [m/s^2]

# Durations in different speed phases
    self.PATH_Acceleration_Time = 0.0 # [s] #By program calculated variable
    self.PATH_Constant_Velocity_Time = 0.0 # [s] #By program calculated variable
    self.PATH_Retardation_Time = 0.0 # [s] #By program calculated variable

    self.PATH_Total_Delay_Time = 0.0 # [s] #By program calculated variable

# Distances for thread chart calculation
    self.PATH_Acceleration_Distance = 0.0 # [m] #By program calculated variable
    self.PATH_Constant_Velocity_Distance = 0.0 # [m] #By program calculated
variable
    self.PATH_Retardation_Distance = 0.0 # [m] #By
program calculated variable
    self.PATH_Total_Distance = 0.0 # [m] #By
program calculated variable

# A TPATH-hoz tartozó DESObject-ek címe
    self.PATH_MACHINE_DESObjects = []
    self.PATH_BUFFER_out_DESObject = []

# Legutolsó frissítés időpontja
    self.PATH_Last_Calculation_Time = 0.0 #By program
calculated variable
    """

#.....
# Python program elements
#.....

# end of def DESBranch_Calculate_Next_State_Of_PATH
# -----

#####
#####
#####

```

```
#####
def DESBranch_Calculate_Next_State_Of_MACHINE(
    self
    LMachine, #TDES_OBJECT

    # Python Output:
    # return [Memo_str,
    # LMachine
    # TRACE_log_str]
    ):
    """
The procedure determines the following state of LMachine TDES_OBJECT.

The LMachine object delays the progress of the Entity object received at its input in
the simulation system by the amount of time specified by its MACHINE_Time_Step
parameter.

The attribute of "Capacity", which must be a positive integer of at least 1 or greater,
specifies how many TMACHINE objects DESObject performs in parallel.
    """

#.....
# Python program elements
#.....

# end of def DESBranch_Calculate_Next_State_Of_MACHINE
# -----
```

```
#####
#####
#####
#####
```

```
def DESBranch_Calculate_Next_State_Of_LOCK(
    self
    LLock, #TDES_OBJECT

    # Python Output:
    # return [Memo_str,
    # LLock
    # TRACE_log_str]
    ):
    """
```

The procedure determines the following state of LLock TDES_OBJECT.

The LLock object delays the progress of the Entity object received at its input in the simulation system by the amount of time specified by its "LOCK_Time_Step" parameter. It is currently set to "LOCK_Time_Step" = 0.0 in the program.

It has one piece of input channel.

```
Input_Channel[0] = Data_Input_class          # Entity input
```

It has two output channels.

```
Output_Channel[0] = Data_Output_class        # Entity output
```

```
Output_Channel[1] = Control_Output_class     # You have control tasks towards
```

UNLOCK

```
"""
```

```
#.....
```

```
# Python program elements
```

```
#.....
```

```
# end of def DESBranch_Calculate_Next_State_Of_LOCK
```

```
# -----
```



```
#####
#####
#####
#####
```

```
def DESBranch_Calculate_Next_State_Of_UNLOCK(
    self
    LUnlock, # TDES_OBJECT

    # Python Output:
    # return [Memo_str,
    # LUnlock
    # TRACE_log_str]
    ):
    """
```

The procedure determines the following state of LUnlock TDES_OBJECT.

The LUnlock object delays the progress of the input Entity object in the simulation system by the amount of time specified by its UNLOCK_Time_Step parameter. Currently, there is UNLOCK_Time_Step = 0 in the program.

It has two input channels.

```
Input_Channel[0] = Data_Input_class      # Entity input
Input_Channel[1] = Control_Input_class    # You have control tasks towards LOCK
```

It has one output channel.

```
Output_Channel[0] = Data_Output_class     # Entity input
    """
```

```
#.....
```

```
# Python program elements
```

```
#.....
```

```
# end of def DESBranch_Calculate_Next_State_Of_UNLOCK
```

```
# -----
```

```
#####
#####
#####
#####
def DESBranch_Calculate_Next_State_Of_SINK(
    self
    LSink, #TDES_OBJECT

    # Python Output:
    # return [Memo_str,
    # LSink]
    # TRACE_log_str]
):
    """
```

The procedure determines the next state of LSink TDES_OBJECT.

The LSink object removes the Entity object from the simulation system that came to its input.

Operational notes:

=====

If the Entity object received at input contains additional Entity objects (or they can contain additional Entity objects), the LSink object removes all Entity objects from the system!

"""

```
#.....
# Python program elements
#.....

# end of def DESBranch_Calculate_Next_State_Of_SINK
# -----
```

```
#####
#####
#####
#####
def DESBranch_Calculate_Next_State_Of_WRAPPER(
    self
    LWrapper, #TDES_OBJECT

    # Python Output:
    # return [Memo_str,
    # LWrapper]
    # TRACE_log_str]
):
    """
```

The procedure determines the next state of the LWrapper TDES_OBJECT.

The LWrapper object waits for its inputs to arrive first with a Package Entity on input 0, and then a specified amount of Entity objects (WRAPPER_Request_At_Channel[i]) on the different input channels.

Input with index "0" is where the container package Entity (Package) arrives.

Inputs with index (i =1..DESObject_Number_Of_InputChannels) arrive at the Entities to be packaged. The quantities required for the input channels are contained in vector WRAPPER_Request_At_Channel[i].

Entity objects store the channel through which they arrived at LWrapper in the Wrapper_Channel_Number_Of_Arrive user attribute.

The self.DESObject_Outputs[0] channel outputs the packaged Entity (Packed_Entities).

Operational notes:

=====

Entities wrapped with the TWRAPPER object can be unpacked ONLY with the TUNWRAPPER object!

The self.WRAPPER_New_Name_of_Package_str contains the new name of the Entity that it contains. If this string is empty(''), then no name change occurs, otherwise the name of the Package Entity will be changed to self.WRAPPER_New_Name_of_Package_str attribute to a new name.

"""

#.....

Python program elements

#.....

end of def DESBranch_Calculate_Next_State_Of_WRAPPER

```
#####
#####
#####
#####
```

```
def DESBranch_Calculate_Next_State_Of_UNWRAPPER(
    self
    LUnWrapper, #TDES_OBJECT

    # Python Output:
    # return [Memo_str,
    # LUnWrapper,
    # TRACE_log_str]
    ):
    """
```

The procedure determines the following state of LUnWrapper TDES_OBJECT.

The LUnWrapper object extracts the package entity (Packed_Entities) received at its input to the object's outputs indexed (i =1..DESObject_Number_Of_OutputChannels).

Input with index "0" is where the packaged Entity (Packed_Entities) arrives.

The LUnWrapper object places the extracted Entities on outputs with index (i =1..DESObject_Input_Number).

Wrapped entity objects contain in the "Wrapper_Channel_Number_Of_Arrive" user attribute which output channel they leave the LUnWrapper object.

The wrapped entities leave the LUnWrapper object first, and the package object (LPackage_Entity) last.

Operational notes:

=====

The TUNWRAPPER object can be used to unpack ONLY Entities that are bundled with the TWRAPPER object!

If the entity DOES NOT have a user attribute with "Wrapper_Channel_Number_Of_Arrive" excuse, it will leave the TUNWRAPPER object as output 0!

If the incoming entity (Packed_Entities) on input 0 does not contain any wrapped Entities, it leaves the TUNWRAPPER object on output 0 without performing an unwrapping operation.

"""

#.....

Python program elements

#.....

end of def DESBranch_Calculate_Next_State_Of_UNWRAPPER

```
#####
#####
```

```
def DESBranch_Calculate_Next_DESTask(
    self

    # Python Output:
    # return [Memo1_str, # len(self.DESBranch_DESTaskList) == 0
    #Memo2_str, #TDESOBJECT_Next_State
    # Memo3_str, # TENTITY_Move_Request
    #Memo4_str, #TPROCESS_Calculating
    #Memo5_str, #TSTOP_Calculating
    # TRACE_log_str]
    ):
    """
```

This procedure performs the action described in the following TDES_TASK.

```

"""
#.....
# Python program elements
#.....

# end of def DESBranch_Calculate_Next_DESTask
# -----

#####
#####
# Calls "DESBbranch_TENTiTY_Move_Request" command in DES_BRANCH
def DESBbranch_TENTiTY_Move_Request(
    self
    Task,

    # Python Output:
    # return [Memo3_str, #TENTiTY_Move_Request
    # TRACE_log_str]
    ):
    """

```

The procedure performs a command "DESBbranch_TENTiTY_Move_Request".

```

"""
#.....
# Python program elements
#.....

# end of def DESBranch_TENTiTY_Move_Request
# -----

#####
#####
# Calls a procedure in DES_BRANCH (to reach all elements of DES_BRANCH)
def DESBbranch_Flush_of_DESObject_Time_In_States_of_All_DESObject(
    self

    # Python Output:
    # return [Memo_str]
    ):
    """

```

This procedure flushes the contents of the text file buffer (writes the remaining block (block remainders) to the text file).

```

"""
#.....
# Python program elements
#.....

# end of def DESBranch_Flush_of_DESObject_Time_In_States_of_All_DESObject
# -----

#####
#####
#Load DES Simulation Model from Text File

```

```

def DESBranch_Load_Model_From_File(
    self
    Model_Path_plus_FileName_str,

    # Python Output:
    # return None
    ):
    """
    The procedure reads a simulation model from a text file into the simulation system.
    """

    #.....
    # Python program elements
    #.....

#end of def DESBranch_Load_Model_From_File
#-----

#####
#####
# Entity is staying in Input Channel of DES_OBJECT.
def DESBranch_ON_AFTER_ENTITY_ENTERED_into_InputChannel_of_DESObject(
    self
    DES_Object, # TDES_OBJECT,
    Entity, #TDES_ENTITY,

    # Python Output:
    # return [Memo_str]
    ):
    """
    This procedure is performed for each DES object when the entity has arrived in an input
    channel in the DES_Object.
    """

    #.....
    # Python program elements
    #.....

#end ofdef ON_AFTER_ENTITY_ENTERED_into_InputChannel_of_DESObject
#-----

#####
#####
# Entity is entered into the DES_OBJECT.
def DESBranch_ON_AFTER_ENTITY_ENTERED_into_DESObject(
    self
    DES_Object, # TDES_OBJECT,
    Entity, #TDES_ENTITY,

    # Python Output:
    # return [Memo_str]
    ):
    """
    This procedure is performed for each DES object if the entity has entered the DES
    object.
    """

    #.....
    # Python program elements
    #.....

```

```

#end of def ON_AFTER_ENTITY_ENTERED_into_DESObject
#-----

#####
#####
# Entity is standing in DES_OBJECT before moving out into one of the Output Channel of
DES_OBJECT.
def DESBranch_ON_BEFORE_ENTITY_EXITED_from_DESObject (
    self
    DES_Object, # TDES_OBJECT,
    Entity, #TDES_ENTITY,

    # Python Output:
    # return [Memo_str]
    ):
    """
    This procedure is performed for each DES object before the Entity exits the DES object.
    """

#.....
# Python program elements
#.....

#end of def ON_BEFORE_ENTITY_EXITED_from_DESObject
#-----

#####
#####
# Entity is exited from the DES_OBJECT.
# It is staying in Output Channel of DES_OBJECT.
def DESBranch_ON_BEFORE_ENTITY_EXITED_from_OutputChannel_of_DESObject (
    self
    DES_Object, # TDES_OBJECT,
    Entity, #TDES_ENTITY,

    # Python Output:
    # return [Memo_str]
    ):
    """
    This procedure is performed for each DES object before the Entity exits an output
    channel of the DES object.
    """

#.....
# Python program elements
#.....

#end of def ON_AFTER_ENTITY_ENTERED_into_OutputChannel_of_DESObject
#-----

#####
#####
# If the Entity is SELF_MANAGED this process executed.
def DESBranch_ON_ENTITY_SELF_MANAGED_OutputChannel_Index_Setting(
    self

```

```

        DES_Object, # TDES_OBJECT,
        Entity, #TDES_ENTITY,

    # Python Output:
        # return [self.Memo_str]
    ):
    """
    This procedure is performed on BUFFER and MACHINE DES_OBJECT to set the index of the
    output channel.
    """

    #.....
    # Python program elements
    #.....

#end of def ON_ENTITY_SELF_MANAGED_OutputChannel_Index_Setting
#-----

#####
#####
# DES_OBJECT requests an external distrubution calculation.
    def DESBranch_ON_EXTERNAL_DISTRIBUTION_of_DESObject(
        self
        DES_Object, # TDES_OBJECT,

        # Python Output:
            # return Time_Step
        ):
    """
    This procedure is performed for a DES object specified as a parameter when calculating
    an external distribution function for the DES object.

    We organize the distribution function calculation in this way because we also give
    values here to the distribution function parameters belonging to the given DES_Object.
    (In the sample example, "alpha" and "beta" parameter values.)
    """

    #.....
    # Python program elements
    #.....

#end of def ON_EXTERNAL_Distribution_of_DESObject
#-----

```



```
#####
# Entity creation for SOURCE DESObject at Entity SELF_MANAGED operation.
def
DESBBranch_ON_EXTERNAL_ENTITY_SETTING_at_SELF_MANAGED_operation_to_SOURCE_DESObject(
    self
    LSource, #TDES_OBJECT,
    LEntity, #TDES_ENTITY,

    # Python Output:
    # return LEntity
    ):
    """
```

This procedure is performed for a selected DES object when we make attribute settings for SELF_MANAGED operation for an entity that we just created on a SOURCE DES object.

```
#####
# Python program elements
#####

#end of def ON_EXTERNAL_Entity_setting_at_SELF_MANAGED_operation_to_SOURCE_DESObject
#-----
```

```
#####
#####
# DES_OBJECT requests an external distribution calculation.
def DESBBranch_ON_STATISTICAL_CALCULATION_in_time_of_Simulation(
    self

    # Python Output:
    # return [Memo_str]
    ):
    """
```

The procedure allows statistical calculations to be performed during the simulation period, which may influence the further course of the simulation.

```
#####
# Python program elements
#####

#end of def ON_STATISTICAL_Calculation_in_time_of_Simulation
#-----
```

```
#####
#####
# DES_OBJECT requests an external distribution calculation.
def DESBBranch_ON_STATISTICAL_CALCULATION_after_Simulation(
    self

    # Python Output:
    # return [Memo_str]
    ):
    """
```

After completing the simulation, statistical calculations can be performed that determine the quality (statistical parameters) of the simulation.

These may refer to the state of the TDES_OBJECT, TDES_ENTITY objects in or out of the simulation system, or other TDES_BRANCH parameters.

```

"""
#.....
# Python program elements
#.....

#end of def ON_STATISTICAL_Calculation_after_Simulation
#-----

```

```

#####
#####
# DES_OBJECT requests an external distrubution calculation.
def DESBRanch_ON_SIMULATION_TIME_RUNNING_FUNCTIONS(
    self

    # Python Output:
    # return [Memo_str]
    ):
    """

```

A summary procedure for procedures to be performed in the Main Loop.

```

"""
#.....
# Python program elements
#.....

#end of def ON_SIMULATION_TIME_RUNNING_FUNCTIONS
#-----

```

```

#####
#####
# All DES_OBJECTs Gantt chart data calculation.
def DESBRanch_Creates_Gantt_diagram_Line_of_DES_OBJECTs(
    self

    # Python Output:
    # return [Memo_str]
    ):
    """

```

This procedure determines the state of the Gantt chart for all TDES_OBJECT elements in the simulation.

```

"""
#.....
# Python program elements
#.....

#end of def Creates_Gantt_diagram_Line_of_DES_OBJECTs
#-----

```

```

#####
#####
def DESBRanch_Print_DES_Element_by_ID_Number(

```

```

        self
        ID_Number,

# Python Output:
# return [Memo_str,
# Found_Object_bool]
#):
"""
The procedure determines which object (TDES_OBJECT or TDES_ENTITY belongs to a given
ID_Number value.
"""

#.....
# Python program elements
#.....

#end of def DESBRanch_Print_DESElement_by_ID_Number
#-----

#####
#####
def DESBRanch_Str_of_Model_DESObjects_Actual_Parameters(
    self

# Python Output:
# return [Memo_str]
#):
"""
The procedure prints out the current parameters of objects of type TDES_OBJECT in the
current model.
"""

#.....
# Python program elements
#.....

#end of def DESBRanch_Str_of_Model_DESObject_Actual_Parameters
#-----

#####
#####
def DESBRanch_Initiate_DESPlot_FloatValues_Vector(
    self

# Python Outputs:
#return [DESPlot_Vector]
#):
"""
Drawing on the screen is to create a vector (DESPlot_Vector of TDESPlot objects and
populate them with parameters.
"""

#.....
# Python program elements
#.....

#end of def DESBRanch_DESPlot_FloatValues_Vector_Init
#-----

```

```
#####
#####
def DESBRanch_DESPrint_FloatValues_Vector_BEFORE_SIMULATION(
    self
    DESPlot_Vector,

    # Python Output:
    #return [Memo_str]
    ):
    """
    From TDESPlot objects to be written to the screen before the simulation.
    """

    #.....
    # Python program elements
    #.....

#end of def DESBRanch_DESPrint_FloatValues_Vector_BEFORE_SIMULATION
#-----

#####
#####
def DESBRanch_DESPrint_FloatValues_Vector_AFTER_SIMULATION(
    self
    DESPlot_Vector,

    # Python Output:
    #return [Memo_str]
    ):
    """
    From TDESPlot objects to be written to the screen after the simulation is complete.
    """

    #.....
    # Python program elements
    #.....

#end of def DESBRanch_DESPrint_FloatValues_Vector_AFTER_SIMULATION
#-----
```

```
#####
#####
```

```
def DESBRanch_DESPrint_FloatValues_Vector_Minimum_Time_Step(
    self
    DESPlot_Vector,

    # Python Output:
    #return [Plot_Time_Step]
    ):
    """
```

From the TDESPlot objects in the screen dump, it finds the minimum DESPlot_Time_Step value, which cannot be zero (0.0) or negative numbers.

```
"""
```

```
#.....
# Python program elements
#.....
```

```
#end of def DESBRanch_DESPrint_FloatValues_Vector_Minimum_Time_Step
#-----
```

```
#####
#####
```

```
def DESBRanch_DESPlot_FloatValues_Vector_Update(
    self
    DESPlot_Vector,

    # Python Output:
    #return [DESPlot_Vector]
    ):
    """
```

Update the plotted values in TDESPlot objects when drawing on the screen.

```
"""
```

```
#.....
# Python program elements
#.....
```

```
#end of def DESBRanch_DESPlot_FloatValues_Vector_Update
#-----
```

```
#####
#####
```

```
def DESBRanch_DESPlot_FloatValues_Vector_Numeric(
    self
    DESPlot_Vector, # TPpintPlot

    # Python Output:
    # return [Memo_str]
    ):
    """
```

The procedure is used to numerically write the content stored in "DESPlot_Vector" to a file. This is only of magnitude detection significance because each plot value is normalized for the given plotter's "self.Plot_Range_Min" and "self.Plot_Range_Max".

```
"""
```

```
#.....
```

```

# Python program elements
#.....

#end of def DESBRanch_DESPlot_FloatValues_Vector_Numeric
#-----

#####
#####
def DESBRanch_DESPlot_FloatValues_Vector(
    self
    DESPlot_Vector, # TPrintPlot

    # Python Output:
    # return [Memo_str]
    ):
    """
The procedure draws the content stored in "DESPlot_Vector" onto the screen.
The value "DESPlot_Size_in_chars" specifies the width of the drawing, which can be 100
or 200 characters.

Every 5th value in the drawing is marked with a '.' character, every 10th value is
marked with a '+' character. (100 characters)
Every 10th value in the drawing is marked with a '.' character, every 20th value is
marked with a '+' character. (200 characters)

This is only of magnitude sensing significance, because every plot value is normal for
the given plotter "self.Plot_Range_Min" and "self.Plot_Range_Max".
    """

#.....
# Python program elements
#.....

#end of def DESBRanch_DESPlot_FloatValues_Vector
#-----

# end of Class TDES_BRANCH
#-----
#-----
#-----
#-----

```

6.9 TDES_BRANCHLIST object attributes and methods

In the description, **attributes** appear in red bold, while **methods** appear in blue bold.

6.9.1 The task of the TDES_BRANCHLIST object is:

The **TDES_BRANCHLIST** object contains the objects required to run multiple standalone simulation models in parallel in the DES Python simulation system.

The **TDES_BRANCHLIST** object contains the following main elements:

- storage vector of each **TDES_BRANCH**, (DESBranchList_BranchList)
- storage vector of current **TDES_TASK** for each TDES_BRANCH, (DESBranchList_TaskList)

The **TDES_BRANCHLIST** object does not have an owner object, so this value is the **None** object. In the DES Python simulation system, this object is at the top level of the hierarchy.

The **TDES_BRANCHLIST** object has a name (**DESBranchList_Name_str**) that is used by the simulation system to identify **TDES_BRANCHLIST**, and a name that can be given by the user and closely related to the operation of a specific system (**DESBranchList_Caption_str**).

6.9.2 Defining the TDES_BRANCHLIST Object:

To create an object of type **TDES_BRANCHLIST** in DES Python, do the following:

```
LBranchList1 = TDES_BRANCHLIST()
```

where:

LBranchList1 The **TDES_BRANCHLIST** object

6.9.3 *Attributes of TDES_BRANCHLIST Object:*

List of attributes of TDES_BRANCHLIST

```
.class TDES_BRANCHLIST
    self.DESBranchList_Owner
    self.DESBranchList_Name_str
    self.DESBranchList_Caption_str
    self.DESBranchList_ID_Number
    self.DESBranchList_Is_Enabled_bool

    self.DESBranchList_Simulationtime_Start
    self.DESBranchList_Simulationtime_Now
    self.DESBranchList_Simulationtime_End

    self.DESBranchList_DES_Cycle
    self.DESBranchList_DES_Cycle_Divider

    self.DESBranchList_BranchList
    self.DESBranchList_TaskList

#####
#####
#####

.class TDES_BRANCHLIST:
    """
    The TDES_BRANCHLIST object stores the TDES_BRANCH objects (DESBranchList_BranchList) in
    the simulation model and the list of tasks (DESBranchList_TaskList).
    """

    def __init__(
        self
    ):
        """
        This procedure creates the properties of the object "TDES_BRANCHLIST"
        and sets their initial values.
        """

        The owner object of the TDES_BRANCHLIST object. Its value = None, making this object
        the highest level object in the simulation system.
        self.DESBranchList_Owner = None

        The name of the TDES_BRANCHLIST in the simulation program.
        self.DESBranchList_Name_str = 'NAME_OF_DESBRANCHLIST'

        The user name of the TDES_BRANCHLIST in the simulation program. The simulation program
        does not apply it to any task.
        self.DESBranchList_Caption_str = 'CAPTION_OF_DESBRANCHLIST'
```

```

        DES_GID_Number.new_value()
The value of the TDES_BRANCHLIST ID Number.
        self.DESBranchList_ID_Number = DES_GID_Number.Value

The authorization status of the TDES_BRANCHLIST. For this object to work, this
attribute must be set to True.
        self.DESBranchList_Is_Enabled_bool = True

The initial value of the simulation time of the TDES_BRANCHLIST.
        self.DESBranchList_Simulationtime_Start = 0.0 #[seconds]

The current(current) value of the simulation time of the TDES_BRANCHLIST.
        self.DESBranchList_Simulationtime_Now = 0.0 #[seconds]

The end value of the simulation time of the TDES_BRANCHLIST.
        self.DESBranchList_Simulationtime_End = 0.0 #[seconds]

The calculation cycle variable for the TDES_BRANCHLIST object. Stores information about
how many cycles have been performed by the TDES_BRANCHLIST object.
        self.DESBranchList_DES_Cycle = 0

The divisor of the calculation cycle variable of the TDES_BRANCHLIST object. The
results of the simulation system are written after the corresponding number of
simulation steps according to this attribute.
        self.DESBranchList_DES_Cycle_Divider = 1000

A TDES_BRANCHLIST is a vector of TDES_BRANCH objects.
        self.DESBranchList_BranchList = []

Stores TDES_TASK objects for branches of type TDES_BRANCH of the TDES_BRANCHLIST
object. The current execution date for each branch in the list.
        self.DESBranchList_TaskList = []

# end of __init__
#-----

```

6.9.4 *Methods of TDES_BRANCHLIST Object:*

List of methods of TDES_BRANCHLIST

```
def DESBranchList_Initiate_Attributes
def DESBranchList_Initiate_TaskList

def DESBranchList_Insert_DESBranch_Into_DESBranchList_AS_LAST
def DESBranchList_Delete_DESBranch_From_DESBranchList
def DESBranchList_DESBranch_by_Name
def DESBranchList_Select_the_Next_Executing_DESBranch_Index
def DESBranchList_Insert_Connection_Between_DESBranches
def DESBranchList_Calculate_The_Next_Task_of_the_Selected_DESBranch
```

```
#####
#####
def DESBranchList_Initiate_Attributes(
    self
    DESBranchList_Name_str,

    # Python Variables:
    # return None
):
    """
```

```
Initialize properties (attributes) of the TDES_BRANCHLIST object.
    """
```

```
#.....
# Python program elements
#.....
```

```
# end of DESBranchList_Initiate_Parameters
#-----
```

```
#####
#####
def DESBranchList_Initiate_TaskList(
    self

    # Python Variables:
    # return None
):
    """
```

```
The TDES_BRANCHLIST object is self.DESBranchList_TaskList initialize its attribute.
    """
```

```
#.....
# Python program elements
#.....
```

```
# end of DESBranchList_Initiate_TaskList
#-----
```

```
#####
#####
def DESBranchList_Insert_DESBranch_Into_DESBranchList_AS_LAST(
    self
    DESBranch, # = TDES_BRANCH()

    # Python Variables:
    # return None
    ):
    """
    Appends the TDES_BRANCH object named DESBranch to the TDES_BRANCHLIST object.
    """

    #.....
    # Python program elements
    #.....

    # end of DESBranchList_Insert_DESBranch_Into_DESBranchList_AS_LAST
    #-----

#####
#####
def DESBranchList_Delete_DESBranch_From_DESBranchList(
    self
    DESBranch, #TDES_BRANCH

    # Python Variables:
    # return [Delete_Branch_OK]
    ):
    """
    Delete the TDES_BRANCH object named DESBranch from the TDES_BRANCHLIST object.
    """

    #.....
    # Python program elements
    #.....

    # end of DESBranchList_Delete_DESBranch_From_DESBranchList
    #-----

#####
#####
def DESBranchList_DESBranch_by_Name(
    self
    DESBranch_Name_str,

    # Python Output:
    # return [DESBranch,
    # DESBranch_Index,
```

```

        # Is_DESBranch_OK]
    ):
        """
The procedure searches for the TDES_BRANCH object by its name (DESBranch_Name_str) in
the TDES_BRANCHLIST object.
        """

#.....
# Python program elements
#.....

# end of DESBranchList_DESBranch_by_Name
#-----

#####
#####
def DESBranchList_Select_the_Next_Executing_DESBranch_Index(
    self

    # Python Outputs:
    # return [Selected_Branch_Index]
    ):
    """
The procedure determines the index of the TDES_BRANCH objects in the TDES_BRANCHLIST
object that will be executed in the next simulation step.

The selection criterion is the TDES_BRANCH instructions to be executed have the lowest
execution time
(. DESBranch_DESTaskList[i]. DESTask_Time_Of_Task i = 0..number_of_branches).
    """

#.....
# Python program elements
#.....

# end of DESBranchList_Select_the_Next_Executing_DESBranch_Index()
#-----

#####
#####
def DESBranchList_Insert_Connection_Between_DESBranches(
    self, #TDES_BRANCHLIST
    Connection,

    # Python Variables:
    # return [Text_out_str,
    # Connection_Inserted_OK_bool]
    ):
    """
The procedure appends the Connection TDES_CONNECTION type connection to the output
channel
to the "DESBranch_DESConnectionList" attribute (vector) of the TDES_BRANCH object
containing it.

Populates the Connection object with the following elements:
=====
OUT elements:
    + Branch_OUT_class          # TDES_BRANCH object
    + Branch_OUT_Index          # the TDES_BRANCH object index in self

```

```

+ DESObject_OUT_class# TDES_OBJECT object
+ DESObject_OUT_Index# index of TDES_OBJECT object in Branch_OUT_class

IN batteries:
- Branch_IN_class          # TDES_BRANCH object
- Branch_IN_Index          # the TDES_BRANCH object index in self

- DESObject_IN_class       # TDES_OBJECT object
- DESObject_IN_Index # index of TDES_OBJECT object in Branch_IN_class
"""

#.....
# Python program elements
#.....

# end of DESBranchList_Insert_Connection_Between_DESBranches
#-----

#####
#####
def DESBranchList_Calculate_The_Next_Task_of_the_Selected_DESBranch(
    self
    Selected_Branch_Index,

    # Python Variables:
    # Memo_str's!!
    ):
    """
    This procedure executes the following command from the TDES_BRANCH objects in the
    TDES_BRANCH TDES_BRANCHLIST object with the index that you specified as the input
    parameter.
    """

#.....
# Python program elements
#.....

# end of DESBranchList_Calculate_One_Task_of_the_Selected_Branch
#-----

# End of Class TDES_BRANCHLIST
#-----
#-----
#-----
#-----

```

List of Functions

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$$\text{Triangle Density} = f(x) = \begin{cases} \frac{2(x-a)}{(b-a)(c-a)} & a \leq x \leq c \\ \frac{2(b-x)}{(b-a)(b-c)} & c \leq x \leq b \\ 0 & \text{egyébként} \end{cases} \quad (2.3.15) \dots\dots\dots 80$$

$$\text{Triangle Distribution} = F(x) = \begin{cases} 0 & x < a \\ \frac{(x-a)^2}{(b-a)(c-a)} & a \leq x \leq c \\ 1 - \frac{(b-x)^2}{(b-a)(b-c)} & c \leq x \leq b \\ 1 & x > b \end{cases} \quad (2.3.16) \dots\dots\dots 81$$

$$\text{Triangle Mean} \quad \mu = \frac{a+b+c}{3} \quad (2.3.17) \dots\dots\dots 81$$

$$\text{Triangle Variance} \quad \delta = \frac{a^2 + b^2 + c^2 - (a \cdot b + a \cdot c + b \cdot c)}{18} \quad (2.3.18) \dots\dots\dots 81$$

$$\text{Exponential Density} = f(x) = \begin{cases} \frac{1}{\beta} \cdot e^{-\left(\frac{x}{\beta}\right)} & x \geq 0 \\ 0 & \text{egyébként} \end{cases} \quad (2.3.19) \dots\dots\dots 83$$

$$\text{Exponential Distribution} = F(x) = \begin{cases} 1 - e^{-\left(\frac{x}{\beta}\right)} & x \geq 0 \\ 0 & \text{egyébként} \end{cases} \quad (2.3.20) \dots\dots\dots 83$$

$$\text{Exponential mean} \quad \mu = \beta \quad (2.3.21) \dots\dots\dots 83$$

$$\text{Standard deviation (exponential variance)} \quad \delta = \beta^2 \quad (2.3.22) \dots\dots\dots 83$$

$$\text{Erlang Density} = f(x) = \begin{cases} \frac{a^k}{(k-1)!} \cdot x^{k-1} \cdot e^{-a \cdot x} & \text{ha } 0 \leq x \\ 0 & \text{egyébként} \end{cases} \quad (2.3.23) \dots\dots\dots 84$$

Erlang Distribution = $F(x) = \begin{cases} 1 - (e^{-a \cdot x} \cdot \sum_{j=0}^{k-1} \left[\frac{(a \cdot x)^j}{j!} \right]) & \text{ha } 0 \leq x \\ 0 & \text{egyébként} \end{cases}$	(2.3.24).....	84
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